ETT-R&D Publications E. Terrell
IT Professional, Author / Researcher December 2001
Internet Draft
Category: Proposed Standard
Document: draft-terrell-logic-analy-bin-ip-spec-ipv7-ipv8-10.txt
Expires June 13, 2002

Logical Analysis of the Binary Representation and the IP Specifications for the IPv7 and IPv8 Addressing Systems

Status of this Memo

Conventions

The '^' sign is the Mathematical Symbol used to represent the Exponential Operation. Where '2^2 = 4', is the same equation represented by '2 * 2 = 4', which is the Multiplicative equivalent. Moreover, it is significant to mention that, the Version Numbers, IPv7 and IPv8, are not the actual Version numbers assigned to these IP Specifications by IANA. However, an application has been submitted for the assignment and use of IP Specification Numbers that would be used to represent the IPv7 and IPv8 versions.

TABLE OF CONTENTS

References

Abstract

The Information Age Revolution established by the Internet, as viewed through its World Wide Popularity, ushered not only a need for additional IP Addresses, which serve the ever growing needs and demands of every individual in the World today. Will also be viewed, through the resolution of the IP addressing problem, as the impetus fueling the Revolution in the whole of the Mathematical and Engineering Sciences as well. In other words, the resolution of the problem regarding the need for additional IP Addresses, and the correction of the Errors inherent in the current system. Resulted not only in the discovery of two New IP Specifications, IPv7 and IPv8, which are logical derivatives of IPv4. But, through the Discovery and Correction of an Error in the underlying Mathematical Logic of the Binary System. It sustains a more pronounced Revolution, having such a profound impact, that it produces Results which not only 'Commands the Fall and the Elimination of the IPv6 IP Specification'(IPng), as the suitable replacement for the IPv4 Specification. But, it Mandates a Change for the Entire Foundation of the Method for Enumeration in the Binary System as well. Needless to say, the daunting implication(s) is that, any change in the Binary System will produce a corresponding change in Machine Language, cascading the effects, which will impact Industries all over the world.

Nevertheless, it will become clear, why such temporary fixes as the Supernetting of IPv4, which yields approximately '4.145 x 10^9' IP Addresses for the entire addressing system, could not work. And while IPv6 yields a greater number of available IP Addresses, approximately 3.4 x 10^38, it remains slightly less than IPv8's 128 Bit Address availability of '3.40282 x 10^38'. Furthermore, when noting the benefits offered by IPv6, which are taunted as being advantageous. No presentation emphasizing its high lights, can suppress the severity of the drawbacks it maintains. In fact, IPv6 is not only cumbersome and difficult to use, implement, and employ. But, it lacks a Mathematically Derived Logical Structure, which results in a 'Default Addressing Structure' being superfluously defined. And it retains its association, Mathematical HEX Translation, with the Binary System this paper proposes to change, because its Method of Enumeration is wrong (e.g.; 'F = 1111 = 15', See Table 8). Not to mention, the employment of a Backwards Compatibility with the Error Plague IPv4 IP Addressing System.

However, because IPv7 and IPv8 are logical derivatives of the IPv4 Specification. The promises offered by the implementation of these IP Specifications, are inherent features, which provides: Ease of use and Implementation; An increase in the number of available IP Addresses; The controls that optimize IP Address distribution and provides a more gradual and stable growth; And its effectiveness in the reduction of the 'Cost per Change Index'. [Which is a measurement used by Companies and Organizations to determine and compare the 'Benefits' (Gains or Losses) vs. 'Cost' (Dollars Invested), with the effects of the 'Impact' and, or 'Needs' that are associated with 'Change'.] Furthermore, while these are just a few of the innumerable benefits, which grant these IP specifications an unprecedented superiority over IPv6. They nevertheless, retain a shadow presence in the possibilities of the benefits, produced by the wake, resulting in the change of more than a 150 years, which is the History of the Binary System of Enumeration.

Furthermore, it was reported that the number of IP Addresses in IPv7 was equal to the IP Address count existing in IPv4. It will be shown nonetheless, even this calculation proved to be in error, which is a direct result of the errors inherent in every explanation of the current IP Addressing System. And while the existing benefits, as seen through the employment of IPv7 and IPv8 remains a valid conclusion, regardless. These benefits, which underlie every presentation, are indeed the hallmark underpinning its logical structure. Moreover, it shall also be concluded that IPv7 maintains a greater number of IP Addresses than IPv4, a total of 4.278 x 10^9*, which is approximately '133 Million' Addresses greater.

'255 x 256^3 = 4,278,190,080 IP Addresses'

Needless to say, even this calculation represents a loss, because IPv7's actual IP Address total is equal to '4,294,967,296 IP Addresses', which is represented by equations '2^32', and '256^4'. However, the reason for this difference, which shall be discovered in latter Chapters, is that, '256' is equal to All Binary 1's, which can not be used to designate any valid IP Address. Notwithstanding, its use, by definition, in the remaining Octets, if it is not use in the Network Portion of an IP Address, which is defined by the 'Subnet Identifier'. And while '0', at least in this case, does not matter because it is an Integer, which is not an element of the Binary Set. Even so, this still amounts to an un-preventable, and staggering loss of '16,777,216 IP Addresses'.

[However, even this IP Address Count Total would not be valid, that is, not unless the use of '127', as the LoopBack Address, were not clearly defined. Where by, if the "LoopBack IP Address" were Defined by only ONE IP Protocol say; 127.1.1.1, which translates into the Binary Representation given by:

'10000000.00000000.00000000.00000000 = 127.1.1.1 '

(See Table 8 for the Justification of the Binary Representation)

Needless to say, this change would not affect the functional use nor purpose of the LoopBack IP Address, because its use serves only the 'NIC' in the Computer in which the Test is performed. But, the use of any viable IP Address Number in the LoopBack IP Address, in addition to '127', would not be beneficial for Reducing IP Address loss. Where by, the preferred choice would entail a selection that would minimize the loss of IP Address Numbers. What this implies, is that, the Positive Integer '1' could be replaced by the Integer '0', as in: '127.0.0.0', which is equal to '10000000.0.0.0', in the Binary Representation. And since, the use of the Integer '0' does not effect nor alter the IP Address total, it is the better choice between the two options. In either case, the Mathematical operations involving '0' are clearly defined by the Field Postulates, and should not change nor affect the outcome resulting from 'Bitwise Anding', because the Integer '0' is not an Element of the Binary Set. Which means, its use in any Binary Operation should equate to the Null Set. Thus, yielding the results given by its former definition in the Binary System.

Furthermore, since the functions of the "LoopBack Address" serve only one Computer, and the IP Address associated with its Network Card, it can be used repeatedly. Therefore, only one IP Address is necessary for use as the LoopBack IP Address. This is because the implications of the foregoing, is that; "Only the Prefix, '127', in the '32 Bit Block Network IP Address', is necessary for use, when defining the Purpose and Function of the 'LoopBack IP'". In which case, all other uses of '127', when defined by the 'Subnet Identifier', could be used to represent a valid Network IP Address.

In other words, this is significantly less than the 149 million IP Address Loss in IPv4, which is the result of Errors, failure to implement a logical structure, and to obey the laws governing its use. Nevertheless, the beneficial effect this has on the IP Address count in IPv7, and ultimately IPv8, is a more efficient use of the Total Number of available IP Addresses. Which translates to a Total loss of approximately 16.8 Million IP Addresses, and an increase of approximately 133 million IP Addresses over the current system. These results are an unquestionable boon for the IPv7 and IPv8 IP Specifications, and their IP Address totals, which calculates to a total approximating '4,278,190,079' IP Addresses, or 4.278 x 10^9*.]

Nevertheless, the calculated IP Address total for IPv7*, when translated to the IPv8 IP Addressing System, yields approximately 1.091 x 10^12 IP Addresses available per 'Zone IP', having a total of '255 IP Area Codes'. Needless to say, this count amounts to a staggering total approximating 2.78 x 10^14 available IP Addresses, in a 64 Bit IP Addressing System, which uses only 48 Bits to equal this IP Address total. Moreover, while it was previously concluded that IPv7 and IPv8 were only an exploitation and expansion of IPv4. It shall be realized that, while IPv7 and IPv8 can be used in place of IPv4 without any loss of the inherent benefits, existing applications, other Protocol relations, or a need for testing in any intra-domain environment. These IP Specification(s) clearly represent a New and distinct IP System of Addressing.

In other words, in addition to having a dramatic Structural change, its departure from the current IP Addressing System is a Logical foundation, which eliminates the errors that beleaguered IPv4. In fact, these IP Specifications established the first True Global Telecommunication Standard. Which is the only IP Specification(s) that encompasses the entire Global Telecommunication Industry, and retains the ease of use and implementation of the familiar IPv4. Nevertheless, the profound benefit of IPv7 and IPv8, is that, they provide the entire Global Telecommunications Industry, as well as every consumer, with enough room for a predicted growth that would encompass the colonization of the Universe. However, this is without the 'Multi-Billion Dollar' cost associated with the training, implementation, or upgrading required by every other 'New IP Addressing Specification'.

Nevertheless, the Overview is an attempt to provide the reader with a succinct introductory foundation of those aspects of the Internet Protocol encompassing IPv4, which entail both the Class and Classless Systems. This portion of the presentation will leave intact those parts of the IP Specification which are directly related to IPv4. While the change that has been previously discussed as Errors, which has plague this system of IP Addressing, will be presented in the topics of this paper that deal with IPv7 and IPv8. The purpose of this method will serve as the necessary foundation for differentiation, which provides the proof, as would be needed, to distinguish the IPv7 and IPv8 IP Specifications as a new Internet Protocol.

In other words, I shall present only those aspects of IPv4 that deal with its methods for IP Addressing, which are similar and directly related in functionality to IPv7 and IPv8. This however, should not be viewed as an over simplification, because the remaining aspects concerning the IPv4 Specification will not change in their respective use, or functional purpose. Needless to say, the rigor encompassing the correction of the Errors in 'IPv4' and the 'Binary Method of Enumeration', are serious enough to render any thoughts to the contrary moot. Notwithstanding, the impact they jointly maintained, which significantly altered the results of the initial presentation for the foundation of the IPv7 and IPv8 IP Specifications. Nevertheless, it should be understood, that the overall objectives this paper maintains, specifically includes;

1. '**Correction of the Mathematical Errors existing in the Current IP Specification, and the Errors in the Logic** of the Method for Enumeration in the Binary System'.

2. '**The Development of an IP Specification(s) essential to the Growth and the Longevity of the Global Internetworking** Community'. Which maintains an overall Superiority to the IPv6 IP Specification and its Inherent Errors, that results from the lack of a Mathematically Derivable Logical Foundation, and its assimilation with the Errors noted in the Current Foundation of the Binary System'.

3. '**Derivation of the Maximum Possible Number of IP Addresses from the Mathematical System defined for use in the IP** Specification(s), which results from the completion of number 2, noted above'. (i.e. the IPv7 and IPv8 IP Specifications'.

Furthermore, while the subject matter presented herein represents an Applied Field of Study. In which the educational demands imposed for an understanding of its use, function, and application, does not exceed the requirement for completion of Grade 12. However, to accomplish the objectives this paper mandates, requires an Analysis of the Theoretical Foundation of the underlying subject matters from which IPv4, and the Binary System were derived. Hence, this paper should only be considered as an excerpt of the underlying subject matter. In which case, it should be understood, as an opinion I maintain, that an extensive treatment and comprehensive analysis in a more gradual, or incremental approach, is the preferred methodology for presentation to the general audience. The thought here, regardless of the subject matter, is that, the justification is fostered when any significant change alters the traditional and established foundation of the Subject being presented. In other words, to avoid unnecessary arguments and the possibility of confusion. The prerequisite this paper maintains, commands and assumes, is that, the readers maintain a level of competency equivalent to either an Engineer, Mathematician, Computer Scientist, or Logician.

And for this, I apologize.

Overview

There are several issues of concern when dealing with the topic of IP Addressing. However, the two main aspects of addressing in the IP Specifications that warrant mention are, Addressing and Fragmentation. Nevertheless, since the methods employed in fragmentation and the IP Specifications dealing with the interaction with other Protocols or its Modules, will not change as such, they will not be a subject entertained in this Overview. Where as, the matters which are presented, deal only with the subject of Addressing and Address Availability in the IP Specifications for IPv4, which encompass the 'Class and the Classless Systems'. Hence, all other related subject matters are beyond the scope of this presentation.

Nevertheless, the current IP Specification methodology for IP addressing in the present Addressing Scheme, is the 'CLASSLESS System'. However, while the IP Specifications employing the 'CLASS System' of Addressing are no longer used. There are similarities remaining in each of these systems, especially since they are both derived from the IPv4 IP Specifications. That is, the shared practices, descriptions, and methodologies of each system is governed by and identified as being:

1. 'The IPv4 Class Address Range';

2. 'The 32 Bit IP Address Format';

3. 'The Method for Subnetting';

4. 'The Principle of the Octet', and

4a. 'The Binary and Decimal representations of the IP Address'.

'The Binary and Decimal representations in the IP Address'

The Binary and Decimal representations are two different mathematical systems of enumeration. In which the Binary Representation is a Mathematical System dealing with the operations of Logical Expressions having only two states, which can be translated to represent Integers and Fractions. While the Decimal Representation, is a Mathematical System involving the operations of Integers, and can only represent the Whole Numbers (Positive Integers) used in Counting. Needless to say, in spite of the existing differences. These mathematical systems are shared and used by both, the Class and Classless Systems.

The difference however, underlies the structure of their respective Mathematical Systems. In other words, only two Binary Representations exist, that being a '1' or a '0'. However, the combined use of One's and Zero's in a series, can be used to represent any Integer. That is, for some representative combination of 1's and 0's in a series, there can exist one and only Integer, in which this Series is Equals. Even then, a Mathematical Equation involving the Integers must exist, which would 'Translate' this Binary Representation into its Decimal (Integer) Equivalent. In which case, the result would be an enumeration Representing 'One-to-One' Correspondence that is an Expression of Equality. In which two different systems represent the same quantity. Nonetheless, each would retain an independence from the other, in any quantitative result of their employ, governed by the Mathematical Laws specific to their operation.

Nevertheless, the mathematical operation used to perform this Translation between the Binary and Decimal representations is Multiplication. In which the equation is an Exponential Operation involving Integers. Where by, for every Translation of any Decimal Integer) number is given by Table 1a.

```
                          TABLE 1a.

              4.    3.    2.    1.
              X     X     X     X <----------|
              |     |     |     |            |
              |     |     |     |            v
1.            |     |     |     |<---> 2^0 = B x 2^0
              |     |     |
2.            |     |     |<---------> 2^1 = B x 2^1
              |     |
3.            |     |<---------------> 2^2 = B x 2^2
              |
4.            |<---------------------> 2^3 = B x 2^3

5.                        etc.
```

Where it is given that, the value of B represents the Binary representation of either a 1 or a 0. Which will equal the value of X (the top of the Table). Needless to say, it should be clear that any Decimal (Integer Value) can be represented using this method. Where by, A Binary value of 1, in the B column of equation 1, is a Binary value of 1 for its corresponding X, and the result of the equation is the Decimal (Integer value) value equal to 1. Hence, the Decimal representation is equal to the Sum of the results from the Equations for which the value of X equals 1, and this process proceeds from the Left to the Right.

Nonetheless, while the process of Translating a Decimal (Integer value) number to its Binary equivalent seems a little more involved. It is nonetheless, the reverse of the process as noted above. Which is shown in Table 2a.

TABLE 2a.

```
       5.    4.    3.    2.    1.
       X     X     X     X     X <-------------> |
       |     |     |     |     |                 |
       |     |     |     |     |                 v
1.     |     |     |     |     |<---> 2^0:  D - (B x 2^0) = Y
       |     |     |     |
2.     |     |     |     |<---------> 2^1:  D - (B x 2^1) = Y
       |     |     |
3.     |     |     |<---------------> 2^2:  D - (B x 2^2) = Y
       |     |
4.     |     |<---------------------> 2^3:  D - (B x 2^3) = Y
       |
5.     |<---------------------------> 2^8:  D - (B x 2^8) = Y
```

In other words, the Reverse process proceeds from the Right to the Left. Which means, according to the corresponding equations: 'The Binary Representation of any Decimal Number D, is equal to the Decimal number (D) minus the Series, starting with the Highest Value of the Exponential Equation representing the Binary Number, which yields a Positive Integer 'Y'. Until the value of their Difference, Y, at some point, is Equal to Zero.

Nevertheless, it is clearly a conclusion, as noted in the Tables above, that the Binary Representation of an extremely large Integer number, would indeed be a very long series of 1's and 0's. Especially since, 1 and 0 are the only numbers used in enumeration in this mathematical systems. In which the equality of a One-to-One correspondence can exist only through the use of a mathematical Translation, which clearly shows the existing differences in their representations.

Nevertheless, the Tables above provided without any specifics or consideration regarding any defining parameters, an explanation of the method regarding Mathematical Translation for the representation of either a Binary or Decimal number, into one or the other.

To be more specific however, in the IPv4 Addressing System, there are Boundary's imposed upon the size of the Binary Series and the Range of The Decimal (Integer Values)Representations, which help to define the 32 Bit Address Range of the Internet Protocol. Where by, there can only be 8 Bits (Binary 1's and or 0's) in a Binary Series, which provides, in Translation, a Decimal Range of 1 - 255, inclusive.

Furthermore, it can also be concluded that a direct correlation between the 8 digit and 3 digit displacements that are the foundations of these respective systems, can not be achieved without some form of Translation or multiplication Factor. Which would render their respective displacements Equivalent. However, it should be clearly noted. There is soundness in any argument for logical foundation that would support such a justification. That is, a One-to-One Correspondence between these two Mathematical Systems could not be achieved without it. In other words, while it is clear that this Digital Representation is an existing difference between them. It should also be understood, that even without Translation they each can only represent one Integer Value.

Needless to say, the possibility of Error in the Calculations involving either of these systems is unavoidable. Especially when either of these Mathematical Systems is used to represent the value, which are the Results of the other. That is, errors become impossible to avoid, with or without performing the necessary Translation to achieve the One-to-One Correspondence. Which maps accurately the Total count of one system to that of other. Saying the very least however, it seems to me, the choice would be to allow either the Machine to manipulate the Binary Numbers, or calculate using only the Decimal numbers, then translate the result to a Binary Representation.

'The 32 Bit Address Format and the Principle of the Octet'

The 32 Bit Address Format in use today, comprises 4 sections, each Having a Binary Series of 8 Bits which can be any combination of 1's and 0's. Hence the name, Octet, represents the 8 Bit Binary representation, of which there are 4 that make up the 32 Bit Address Format. Nevertheless, its Decimal Translation, yields a Dotted Notation having an Integer Range of 0 - 255 inclusive.

'The IPv4 Address Class System'

The IP Class System, while somewhat blurred through the use of the Subnet Mask in the Supernetting methodology of the Classless System, it has not yet, lost the significance of its use.

Nevertheless, it is given by the defacto Standard that the IP Class of A given Network Address is determined by the Decimal value of the First Octet, which relative to the IP Address Class Range in which it is associated. This method is used in conjunction with the Default Subnet Mask to determine the total number of IP Addresses available for the calculation of the total number of Networks and Hosts, and their distribution counts for every IP Address Range. Where by, the Default Subnet Mask maintains a Decimal value of 255 for every Octet in which it is assigned. This Decimal value translates to a Binary Representation Of all 1's, or 8 Binary 1's (11111111) in every Octet in which it is used.

However, the mathematical method employed to resolve the Network IP Address in which the Default Subnet Mask is associated, is called BITWISE ANDING. Nonetheless, Bitwise Anding is a mathematical operation Involving the Binary System, and is given by Table 3.

TABLE 3

1. 1 and 1 = 1
2. 1 and 0 = 0
3. 0 and 0 = 0

Where by, the process of BITWISE ANDING is a Machine calculation that Can be performed by anyone. Its functional purpose is the resolution of an IP Address, which can be either a Network or an associated Host.

Nevertheless, the IP Class structure while providing a count of the Total Networks and Hosts for each IP Class, as shown in Table 4. It additionally, provided the IPv4 Addressing System with a structure, methodology, and a small set of rules to govern the distribution, deployment, and management of IP Addresses within any given Internetwork or Network domain.

Nonetheless, Table 5 provides the description of its Binary interpretation, which is related to the number of available Binary Digits that can be used, when translated, to determine the Decimal Notation an IP Address, and the total number of addresses available.

Table 4.

Structure Decimal of the IPv4 Representation IP Class System

1. Class A, 1 - 126, Default Subnet Mask 255.x.x.x:
   126 Networks and 16,387,064 Hosts: 0

2. Class B, 128- 191, Default Subnet Mask 255.255.x.x:
   16,256 Networks and 64,516 Hosts: 10

3. Class C, 192 - 223, Default Subnet Mask 255.255.255.x:
   2,064,512 Networks and 254 Hosts: 110

4. Class D: 224 - 239; Used for Multicasting, No Host: 1110
   16 x 254^3 = 262,192,024 IP Addresses available

5. Class E: 240 - 254; Denoting Experimental, No Host: 11110
   15 x 254^3 = 245,805,960 IP Addresses available

Table 5

Structure of the Binary Representation of IPv4

1. Class A: 1 - 126, with 8 Bit Network Count and 24 Bit Host count or 16,777,216 Hosts; Where 0 (Zero) and 127 reserved unknown Network and Loopback, respectively.

2. Class B: 128 - 191, with 14 Bit Network Count and 16 Bit Host count or 65,536 Hosts

3. Class C: 192 - 223, with 24 Bit Network Count and 8 Bit Host count or 256 Hosts

4. Class D: 224 - 239; Used for Multicasting, 32 Bit IP Address Count

5. Class E: 240 - 254; Denoting Experimental, 32 Bit IP Address Count

Note: There is no Division of Classes D or E. In fact, the definitions provide descriptions of their functional use.

The Rules that enabled and govern the structure of the IPv4 Addressing System, are indeed laws. Where by, either the Internetwork or Networking Domain could become disabled, if a violation of any one or more of these laws occurred. Nevertheless, the laws as outlined in Table 6, represents a Set of Restrictions regarding the Binary and Decimal values assigned to a given IP Address. However, any further, or more detailed analysis of Table 6 would be superfluous, because the presentation itself, is a definition.

Nevertheless, notwithstanding the benefits that the Hierarchical (0rganizational) Structure of the IPv4 Class Addressing Scheme provided the Networking Community as a whole. The treatment rendered, regarding its explanation, while somewhat shallow, shall suffice the overall purpose, which outlines the objectives of presentation.

TABLE 6

1. **The Network Address portion of an IP address cannot be Set to either all Binary Ones or All Binary Zeros**

2. **The Subnet portion of an IP address cannot be Set to either All Binary Ones or All Binary Zeros**

3. **The Host portion of an IP address cannot be Set to All Binary Ones or All Binary Zeros**

4. **The IP address 127.x.x.x can never be assigned as a Network Address**

'The Differences between the Class and the Classless Systems'

The fall of the IPv4 Class System of Addressing, as such, is viewed the result of the lack of IP Addresses available for distribution, which services the very need of the every growing Global Internetworking Community.

Nevertheless, the IPv4 Class System has been described as an Organized Hierarchical Class Structure. But, this not a definitive depiction, Noting that there are parts yet remaining within the IPv4 Class System, that are indeed wanting of a more conclusive and exacting definition of their functional purpose. This is a reality, which becomes even more apparent upon analysis of the use of Default Subnet Mask for the Class B. That is, when compared with the results of Appendix II and the definition of the use and purpose of the Default Subnet Mask. Where by, it is clear from the definition of the Default Subnet Mask. That its purpose defines the location of the Octet, which is assigned some Decimal Value from the IP Address Class Range.

While its second use is the identification or resolution of a Network or Host IP Address. However, clearly this is not sufficient. This is because, the processes underlying its functional purpose are assumed, and based upon descriptive use, and not the soundness of Logical reasoning derived from definitions.

What this implies, is that only the first Octet of any given Default IP Address, maintains the right to be governed by some value relative to the IP Address Range, which defines the IP Class to which any given IP Address belongs. This, to say the very least, confounds the purpose and use of the Default Subnet Mask in general, if not overall. This is especially true for the results of Supernetting in IPv4, and maintains an even greater significance regarding truth as to the possible root cause for the IP Address shortage in the Class System. Nevertheless, while the former might seem questionable. The latter however, entertains more plausible reality, especially since the Supernetting of IPv4 resulted in a significant increase in the number of available IP Addresses in IPv4.

In other words, given the Class B as our example. Which has a Default Subnet Mask of 255.255.000.000. The foundation for this argument becomes apparent from an analysis of the results the given by equation 1a. Where it is shown that we could conceivably derive two different Decimal values, which would be an equally accurate determination of the number of Networks present in Class B. That is, provided there does not exist a more precise definition, and or, functional use of the Default Subnet Mask. And this is true, at least, regarding the present interpretation and use of the Default Subnet Mask.

1a. 64 x 254 = 16,256 "OR" 64 x 64 = 4,096

(That is, given that: Class B 128 - 191,
Default Subnet Mask 255.255.000.000)

What this implies is that, at present there does not exist within the IP Specifications of IPv4 definitions we can use, which would provide any degree of certainty regarding the correct methodology to be employed in IP Addressing. And while, this reported anomaly does not directly effect or prevent IP Addressing. It clearly demonstrates regardless of the method employed, that these are different numerical values representing the same object. Which are both, significantly less than the reported number of available Network Addresses as determined to be the calculated result of the Binary value given by 2^14 (16,384). Furthermore, it should be understood without the indulgence of another example, this conclusion is applicable to the Class C as well. (This problem is eliminated in IPv7.)

NOTE: This issue is even more pronounced when one

considers the Bit Count of the Number of Host
for each of the Default IP Address Class Ranges,
and its corresponding Decimal value.

Nevertheless, the concept of Masking and its inverse, 'Un-Masking', deserves some attention. That is, the Subnet Mask, which is the Catalysis for this presentation, is used by both of these Systems, the Class and Classless. However, it is the concept of the Subnet Mask, as it shall be discovered, which maintains a far greater significance when distinguishing the difference between these two Systems.

Notwithstanding, the notion, idea, or evolution of the Class System, Which would have been a resulting consequence, predicated by some inseparable component regardless. Where by, the misnomer, 'Classless', is not the existing difference, which mandates the defining distinction that separates these Systems. Needless to say, the doubt, which the underpinning of this conclusion surmounts, is the functional definition and the associated boundaries of the IP Class Addressing System. Which is indeed, the IP Addressing Divisional Methodology employed by each of these Systems.

Nonetheless, without any support outlining or defining a Structure, one such component whose defined function, which would have caused the predestine evolution each, is indeed that of the Subnet Mask. Where by, the associated problems concerning IP Address availability were resolved through the creation of another Sub-Division of the Subnet Mask. Which indeed, is the 'DEBARKATION LINE', defining the difference between these Systems. However, this was a two-phase progression, involving two divisions of the Subnet Mask, the VLSM and the SUPERNETTING of the Class C, CIDR. Nevertheless, Supernetting maintains the distinction as being the USHER for the Classless. That is, the underlying difference distinguishing these Systems. It does moreover, impose a barrier, which limits the overview's presentation to the relevance pertaining thereto.

Nonetheless, it is worthy of mention, noting that Supernetting can be viewed as a refinement of VLSM, Variable Length Subnet Mask. However, the promises of Supernetting, when viewed from its exploitation of the Class C, as relinquishing the dependence upon the Class Structured System, can be realized only if this application is applied to the remaining Classes. At least, this is the current and accepted outline of the Populist's view of the objectives presented. Notwithstanding, the most discomforting drawback encompassing this objective, is the elimination of the process and use of the Default Subnet Mask(Which is blurred anyway.). Which ultimately means, the redefining of the functional use of all Binary 1's and 0's within the any given Octet, and the loss of the Logical Structure in IP Addressing as well.

Nevertheless, there is indeed a warrant for an analysis of the process of Supernetting, which transcends the obligations of this overview, and imposes a dialectic upon this presentation in general. Needless to say, the foundational support of this argument is the underlying objectives found upon the Internet Draft upon which this presentation resides.

Nonetheless, prior to the analysis and investigation of Supernetting, a brief introduction of some of the foundational principles of Subnetting, from which Supernetting is derived, is indeed required.

The Binary Representation of 1's and 0's, and the specific rules for their combination or usage, is the chosen form of communication used in Machine Language. The principles of BITWISE ANDING was presented in the Section entitled, "The IPv4 Address Class System", which is the Mathematical method used by the Computer when the Subnet Mask or the Default Subnet Mask is used to resolve either a Network or Host IP Address. That is, if you were given a Decimal Network IP Address of 172.16.182.19, the Machine or Computer could not read nor translate these Integers into any usable format. That is to say, there is a Translator for the Input and Output for the Computer, because its language is of the Binary Format. In other words, the Computer would read the Input of the IP Address, 172.16.182.19, as given in figure 1.

```
                         Figure 1
             Bit Map of the 32 Bit IP Address

       10101100    00010000    10110110    00010011
```

However, through the use of the Default Subnet Mask, 255.255.255.000, and its Binary translation, as given in figure 2. The Computer or Router could, through the use of Bitwise Anding resolve the Network Address for the given IP Address, as shown in figure 3. Whose Decimal translation through the Binary Mathematics of Bitwise Anding would yields the Network IP Address as, 172.16.182.000.

```
                         Figure 2
             Bit Map of the 32 Bit IP Address

       11111111    11111111    11111111    00000000
```

Figure 3

Bit Map of the 32 Bit IP Address

```
10101100    00010000    10110110    00000000
```

Nevertheless, there are several advantages that can be ascertained Through the use of the Subnet Mask, and even more, if the mathematics of Bitwise Anding remain same. In other words, the problems associated with the difference between the Binary and Decimal methods of enumeration do not exist within the Machine's Mathematical Calculations for the Translation into the Binary format. That is, the Binary Format allows for the manipulation of individual BITS. Where by, the resulting Decimal Translation could be either a Fraction or an Integer. In which case, it is assumed that any resulting Fractional Component produces a Range of possible Subnet numbers in which several Network IP Addresses might belong. (Supernetting)

Nonetheless, the Breaking-Up, or the division of any Network into Smaller Sub-Networks, is called Subnetting. Which is accomplished through the use of the Subnet Mask. Where the Subnet Mask can be used or mapped onto any Octet, except the first Octet, which is used to identify the Address Class Range to which a particular IP Address might belong. Needless to say, there is a De Facto process by which a Subnet Number is chosen, and these numbers are given in Table 7.

TABLE 7

Values of Least Significant Bit:	Binary Representation:	Decimal Equivalent:	Number of Subnets:	Host/per
0	00000000	0*	0	0
2^7	10000000	128	1	128
2^6	11000000	192	3	64
2^5	11100000	224	7	32
2^4	11110000	240	15	16
2^3	11111000	248	31	8
2^2	11111100	252	63	4
2^1	11111110	254	127	2
2^0	11111111	255*	N/A	

Note: The 'Asterisk' represents Values that can not be used by the OCTET, which is define by the 'Subnet Mask', this is a Law/Rule.

Nonetheless, the first example of the use of the Subnet was that of the Default Subnet Mask, which was used with the Binary Mathematical Operation of Bitwise Anding to resolve the Network IP Address. However, from the list summarized by Table 7, the Subnetting concept can be further expanded, and use in an example to demonstrate the division of a Network Address into several smaller Network Addresses. That is, if given the Parent Network IP Address of '172.16.0.0', for which smaller Subdivisions are sought. This being the conclusion based upon an examination of the over all Network performance and needs. Then the appropriate Subnet Mask can be derived from the 7 choices given by Table 7 based upon the conclusions.

Wherefore, if '252' is chosen, the IP address of this Decimal Number corresponds to the Subnet Mask given by an IP Address of '225.255.252.0'. In which a total number of 63 available Subnets can be generated from '252'. Which is the result generated by its (252) division by the factor determined as being the value of the Least Significant Bit of its Binary Representation (4). However, the inclusive count would maintain a composite value equal 64, which includes 252 in the total. Nevertheless, the resulting Subnet IP Addresses generated would be determined by sequential additions of the Least Significant Bit (4) to the Parent IP Network Address. Which also determine number of hosts per Subnet, and is summarized in Table 7.

Notwithstanding, that the example above was a demonstration of the concepts and the principles underlying Subnetting. However, its principles and concepts needless to say, is the foundation from which the principles underlying the concept of Supernetting is derived. Moreover, since it is the First Octet that is reserved for the Identification of the IP Address Class to which any IP Address belongs. The example chosen could have been selected from any one of the 3 primary IP Address Classes. Hence, Supernetting is the Subnetting of an IP Address having the Default Skeletal Structure as defined for the Class A.

The concepts for the principles and beliefs in the Classless System, in closing, is a derivation from the concepts of 'CLASSLESS INTERDOMAIN ROUTING' (CIDR). In which, the basic strategy involves the 'Combining of Multiple IP Addresses into One AGGREGATION' by using IP Bit Address of the Subnet Mask from one of the Address Class Divisions, essentially forming One Network. Hence, the creation of an Addressing System in which every Division would have the same 'Default IP Address Structure'. And whose resulting overall IP Address number would exceed that of the initial IP Address Class, and could be Routable using a 'One Route Path' for its thoroughfare. In other words, the only real difference between the CLASS and CLASSLESS Systems is that of the Routing Methodology they employ.

Chapter I: The Analysis of the Errors Plaguing IPv4 and the Binary System

The Overview's presentation highlighted some of the most significant principles involved in the IP Specification of IPv4 Addressing. It also provided a glimpse of some of the problems associated with the error(s) existing in the IPv4 Addressing System. However, while almost every inherent flaw that exist within this System can be shown to be an ambiguity resulting from the lack of an adequate Logical structure or precise definitions. There also exist another foundational error, which thwarts all the traditional proofs that would encompass an elementary analysis and presentation. In fact, I can conclude with a measurable degree of certainty, especially since the resolution of this problem entertains elements from the branch of Mathematics known as Number Theory, and the principles derived from my works dealing with the proof of Fermat's Last Theorem, from which the 'Logic of Quantification' was derived. That this error, which is the problem associated with the difference existing between '255' and '256', is not only the source of this confusion, but it severely hampered the results of every mathematical calculation in the IPv4 Addressing System.

Furthermore, it should be understood, this is a problem that includes IPv7 and IPv8. In other words, the overwhelming significance that underlies these IP Specifications as the Logical Succession to IPv4, is the use of an identical method of enumeration for IP addressing. Nevertheless, the initial proof of Fermat's Last Theorem concern the concept of the "Common Coefficient" and the association thereto, which contrasted the difference between Exponential Functions. This difference, which form the bases for proving Fermat correct in his assumption: " There are no solutions in Whole Numbers to the Equation; 'X^N + Y^N = Z^N', where N is greater than 2", also maintains and establishes the "Common Coefficient" as the binding force for its validity. Where by, it was a fact established within the proof, that in all cases there must exist a "Common Coefficient", which was determined to be a sequential growth pattern starting with and incremented by an additive factor of '1'. Which also, mapped directly with the "Counting Numbers"; 1, 2, 3, ... etc.

However, the underlying logic here, concerned only the Base and the results from the calculation of the Exponential Power to which it was raised. Which also established that these conditions were not valid for all values of the Base, and were true only for Exponential Powers Equal to 2. In other words, Fermat was correct in his assumption 'If and only If' there exist an "Common Coefficient" between the Base and the results from the Exponential Power to which it was raised, which itself a is whole number (Positive Integer). These results were indeed profound, because they promoted the need to rethink the very foundation underlying the entire mathematical field, and enhanced the use of the Exponent with the precise definition of being a Logical Operator. Who's underlying function and operation was also a 'Short-Hand' method to reduce the size of an equation, which contained repetitious operations involving identical multiplicands or expressions.

What this ultimately meant, was that, its functional use now maintained a more broader benefit, which could now be applied to Pure and Applied Mathematics, and their underlying Logic as well. Furthermore, while this conclusion was derived from the first proof of Fermat's Last Theorem, it served no direct purpose in the proof.

However, this was not the first use of the Exponent in logical Analysis. In fact, George Boole, in his "Theory of the Laws of Thought', use the Exponent to establish the significance of '1' and '0' as a foundational premise, which the "Truth Table" and "Boolean Algebra" were later derived. Nevertheless, the Exponent assumed a pivot role in a second proof. Where by, the Exponent, for the first time, was defined as having obtain a permanent place in a Pure Logical Environment. This was indeed an advancement in Logical Analysis. Which not only allowed for the Exponential Expansion of the Operations involving Set Theory and the Field Postulates, developed the Theory for an Algebra that is Finite and obeys the Closure Laws, but laid the foundations to derive the "Distributive Law for Exponential Functions" as well. In other words, George Boole's work established the foundation from which the Binary Mathematics used in IP Addressing was derived. Which in every respect, it is indeed equivalent, if not identical to any Mathematical Theory, which must obey and be governed by not only the Laws and Rules pertaining thereto, but, those Laws and Rules governing the underlying Logic as well.

Nevertheless, the above represented the grounding foundation for the analysis to determine the difference between "255" and "256", and the reason for assigning the Binary Number 2^8 as being equal to 255. Which raises several questions concerning the How's and Why's, regarding an explanation, which would rationalize the reason for building the foundation of the Binary Mathematics upon an Error. Where by, equation æ1Æ provides the platform from which this analysis shall begin.

1. 2^8 = 255 = 11111111

The above represents the current and acceptable value for the Binary Representation of the 'Decimal' number 255. However, this is truly an error in the calculation for the determination of value of 2^8. Where by, the actual value of 2^8 is given in equation 2.

2. 2^8 = 256 = 11111111

While the actual Binary Representation for 255 is given by equation 3.

3. 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 =

128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 =

255 = 11111110

Nevertheless, it is clear from any study of Elementary Mathematics that the Exponent can be assigned to any value maintained by the variable 'X'. In fact, it is from this association with the variable, that a Theory of the Operation and the Laws governing the Exponent were derived. And while its value may be associated with any Number Group within the Field Postulates. It is the result from the Equation of the combined value of Base and the Exponent, which determines the Number Group it belongs.

However, the functionality of the Exponent, which established its use in logical Analysis, and forms the foundation for this argument, is that, the Exponent can never generate a Null value, or be equated Zero. Needless to say, the significance of this conclusion, emphasizes the importance of the 'Short-Hand method' for representing any Mathematical or Logical expression, in which repetition becomes the issue. Which again, is dependent upon the value resulting from an argument involving the Base and the Exponent in the Equation in which it is used.

The fact that the Exponent can not generate a value of Zero in any equation in which it is used, is a fact derived from the laws governing the operations involving the Exponent, and it is a conclusion given by equation 4. Where by, it was established in the Elementary foundations of Algebra, that:

```
{(A, X) | 'A' and 'X' are both elements of 'R'};
 when only 'X' equals 0:

      4.  A^0 = 1,

   and if there exist a case, where by:


{(A, X) | 'A' and 'X' are both elements of 'R'},
 when only 'A' equals 0:


      5.  0^X = 0,


  and in all cases, we have:


{(A, X) | 'A' and 'X' are both elements of 'R'},
 when both equal 0:

      6. 0^0 = 0,

   and again, in all cases, we have:


 {(A, X) | 'A' and 'X' are both elements of 'R',
  when 'X' = 1:

     7. A^1 = A
```

These are the fundamental Principles of the Exponent, which invokes the provision that allows the Exponent to be utilized in both pure and applied Mathematics or Logical Analysis. However, 'George Boole' did not seem to grasp these principles, but he clearly understood the logical implications when the value of the Base equaled either '1' or '0', in an equation having an Exponent equal to 2.

Nevertheless, it should be pointed out that, while equations '4', '5', and '7' are established laws governing the operation of the Exponent, Equation '6' is not, but, it can be shown as a resulting derivative. In other words, the Principles of the Exponent established a 'Conditional 2 State' relationship between the Base and its Exponent, that does not alter the value of the expression when either of their values is a '1' or a '0'. These states or conditions, which are associated with '1' and '0', yields a Constant result that is independent of the changing value of either the Base or the Exponent, depending upon which of the equations above noted are used. However, there is only one state in which the Base and the Exponent are equal, and the result of this Equation, is an identity equaling that given by these components, which is 'A True Value of 0'.

Nevertheless, what the foregoing suggest, relative to the respective values of the results from all of the Equations noted above, and its Base and Exponent. Is that, the Exponent itself, is another form of Counting, which determines the number of multiplicands used in the equation yielding a Product. This conclusion becomes even more evident, when the process of this New form of Enumeration is clearly understood. Where by, it is from 'The Method of Quantification', that the concept of the Common Coefficient obtained not only a greater significance, but an overwhelming value in the proof of Fermat's Last Theorem. In other words, consider the Law, as deduced in Elementary Algebra, which provides the logical justification for equation 4, noted above.

8. "If A, C are elements of R, and A is not equal to 0, where b, p are elements of N, where b > p, then;

8a. A^b/A^p = A^(b -p) and (A/C)^b = A^b/C^b

Which means:

8b. For every A that is an element of R, and A is not equal to 0 and b, p are elements of N, and b > p, then:

A^b/A^p = A^(b -p), this means, that if b = p, then;

A^b/A^p = A^(b -p) = A^0, and Since, b = p, and p = b

Therefore,

8c. A^b/A^b = 1, Hence, A^b/A^b = A^(b - b) = A^0, then

8d. A^0 = 1

Where by, it should be understood that, 1 x A^0 = A^0,
and '1' is the Coefficient of A^0, which is also equal
to '1 x 1 = 1 x A^b / A^b = 1 x A^(b - b) = 1 x A^0',
for the {1, A, b} | 1, A, and b are elements in 'R'.

In other words, if this were an actual mathematical operation, in lieu of a method of Counting, then any equation having an Exponent whose value is zero, would generate a value of zero for the equation in question. This is because, the Exponent is nothing more than a 'Short-Hand' method for representing the number of multiplicands that repeat within a given equation, which answers the question; 'How many Multiplicands equaling the value of the Base are there?' And in equation 4, noted above, since there are no (zero) multiplicands, then the result is equal to the value of the Coefficient, or '1'. Which is noted by number '8' above, as being equal to '1 x 1 = 1', where '1 = A^b/A^b = A^b - b = A^0'.

Thus far, I have spoke of the Exponent as being another method of Counting'. However this, in and of itself, is meaningless, because there are several ways, and forms of enumeration. To be specific however, when I speak of Counting, I am referring to the Set of 'Positive Integers'. While yet, I have already mentioned that, the Exponent can represent the value of the any variable, which is an element in 'R'. But, the purposes expressed here, concerns the Binary Representation, and the inherent method of enumeration is the 'Positive Integers'. The point to be made here, is that, there must exist a One-to-One Correspondence between the value Exponent, equal to the variable 'X', and the Number Points on the line, the Positive Integers, represented in figure 4 below.

FIGURE 4

```
--+--+--+--+--+--+--+--+--+--
  0  1  2  3  4  5  6  7  8
```

However, before I can begin this analysis, I must first establish where the starting point for the Binary method of enumeration would exist. That is, I must first establish the location, with respect to the Number line, of the FIRST POSITIVE INTEGER. This is the location of the Point in which any succession, by an additive factor of '1' would begin.

Nevertheless, while the Base, Exponent, and their Result, are elements of 'R'. The 2 states, '1' and '0', which combine to represent the result from this equation, are not elements of 'R'. And while, George Boole Employed their use in his work, because these, at the time, were the only values that did not change the result of an equation, regardless of the value assigned to the Exponent. This fact, needless to say, is evinced by the 'History of Mathematics', because it is recorded that 'Set Theory' was developed about the same time period as the work of George Boole. In other words, the 'Operators' used in Mathematics are not the same as those used in the Logical Analysis of Statements. And it is this fact alone, which allowed the Exponential Expansion of 'Set Theory', that not only resulted in the "Distributive Law of Exponential Functions", but the evolution of "Finite Mathematics" as well.

What this means, is that, the 'States', '1' and '0', can not have the same meaning as would result if they were defined as being elements of 'R'. This is seen true because, NO Statement can have or maintain a 'Zero' meaning or value. And if the contrary were the case, then the statement would not exist, because its value would be defined as 'NULL'. In which case, there would be absolutely no distinction between a 'Null' or 'Empty Set', and one in which its members were not related in some comparison. Which would yield a 'Null' result, if such a comparison were made between 2 or more 'Statements', and they were all distinctly different. In other words, '0' is a Symbolic Binary Notation used in Binary Mathematics, which has absolutely No relationship with, nor is it equal to, the Null value that is Empty, or the non-existent representation provided by 'Zero', when '0' is an element of 'R'.

The conclusion of the foregoing becomes even more evident, when an understanding of the function of the Base and equation 6, as noted above, is achieved. Where by, it should be understood, that the Base in the Exponential Equation of Binary Mathematics, represents the total number of 'States' contained in the 'Set' of all elements representing the members of the Binary Notation. In this case, there are only 2 elements or members of this 'Set', which forms the Logic of its foundation.

10. {(1, 0) | (1, 0)} are Symbols, which are the elements used in Binary Notation.

Nevertheless, it should be emphasized that, equation 6 represents a condition in which the 'Set', whose members are elements of the 'Binary Notation', as noted in 10 above, is 'Empty'. That is, it contains No members, and represented by 11 below.

11. "If there exist such a case where (1, 0) = (,), then {(1,0) | (1, 0) = {0}, is the 'Null Set' and contains No members." Expressed Mathematically, we have:

11a. 0^0 = 0

What this means is that, the Symbol '0' in Binary Notation, is Equal to Zero, when '0' is an element of 'R'. The reasoning here, is that, there must exist, in Binary Notation, a Point of Progression By some representative of '1', which would generate a Series in Counting. The resulting Series must maintain a One-to-One correspondence with the 'Positive Integers', and can only utilize the "1's'" and "0's" as a 'Method of Counting' to achieve this result. In other words, the "1's" and "0's" as such, do not maintain a distinct value, as such, in Binary Notation. They in essence, establish the Foundation, which is the 'Number Pair' in Binary Enumeration, used for Counting. Which ultimately means, they do not, and can, maintain nor establish by themselves, a direct relationship with the 'Positive Integers'. In which case, it would be their combine usage, which provides a 'Method of Counting' that represents some Numerical Value being an 'Element of R'.

Therefore the meaning of the results of equation 4, as noted above: "Is the 'Set' of All the Elements contained in the 'Set', which represent the elements of the Set containing the members representing the 'Binary Notation', can have ONE and only ONE member". Which means in addition, that when there exist such a case as denoted by equation 4, then the situation is that, only one possible result can be derived. This implies moreover, the existence of a 'Count', which is number whose value is inherent in the count of the total number of 'States' that exist, which is also a 'State'. In other words, the total number of possible 'States', which is represented by '1', is equal to 2, and the total number of 'Non -Zero' 'States', that is represented by '0', is equal to 1.

Nevertheless, the Logical reasoning of the latter is established and validated through the used of 'Truth Table Analysis'. Where by, given any Statement, which can be either True or False for the same condition, we have:

12a. If in any Statement, when such conditions are set forth, that the Statement represents a value that is True, then there are 2 equal possibilities. Where by the Statement itself, is either 'True AND False', or it is 'True OR False', these are the only possible conditions that exist.

This is to say, for any True Statement, the total number possible of 'States' that can exist, which represent the value of this Statement, is 2.

12b. 'True AND False is True, or 'True OR False is True' Which is expressed Logically as, 1 = 2; 2 possibilities represented as:'

1 = 1 'AND' 0 = 1, or, 0 = 1 'OR' 1 = 1.

Where its Exponential (Mathematical) Representation is given by equation 7, noted above. Hence,

12c. X^1 = X, or the Binary expression

becomes; 2^1 = '2'

13a. If in any Statement, when such conditions are set forth, that the Statement represents a value that is True, and has only 1 possible solution. Then equally valid, only a True OR a False condition exist, such that, the total number of 'States' for which this Statement represents, is 1.

13b. 'True OR False is True' Which is expressed Logically as, 0 = 1; 1 possibility represented as:'

0 = 0 OR 0 = 1

Hence, '13b' is represented Mathematically as being the same as:

14a. A^0 = 1, Positive Integer = 1

and

14b. 1^0 = 1, or 2^0 = 1, Binary Representation = 00

Nevertheless, the validity of 14b, which was derived as a from the foregoing argument, maintains that, there exist only '1' possible 'State that can be derived from the Binary representation of '0'. This is true, especially since, the Binary Representation of a Zero condition, is the same as that represented in the 'Positive Integers'. In other words, the Binary Notation for a '0 State', which is not equal to Zero, or an 'Empty Set', can equal only one of 2 possible States. In which case, only '1' solution or State can exist!

Therefore, the correct mapping of the One-to-One Correspondence existing between the Binary Method of Counting or Exponential Enumeration, and that of the 'Positive Integers'. Is derived from the foregoing logical analysis and based upon equations 15, 16, 17, which provides clarity to the logical analysis and justification for conclusions displayed in Table 8 below. Where it should be understood, that in all cases, the 'Null Set', the 'Positive Integer 0', and the 'Empty Set' in the Binary Notation, are all Equal representations, which establish an identity with the same entity.

15. 00000000 - 00000000 = {0} = 0, Integer

16. 00000000 + 00000000 = 00000001

OR

16a. 00 = 1, Positive Integer

17. 00000001 - 00000000 = 00000000

AND

17a. 01 - 00 = 00 = 1, Positive Integer

TABLE 8

"The Reality of the Binary System of Enumeration"
"And the Series Generated when Counting, using
only " 1's " and " 0's, which are the
Abstract Entities belonging to the
Binary Set"

	æExponential EnumerationÆ	æBinary RepresentationÆ	æPositive IntegerÆ
	^	^	^
	/ | \	/ | \	/ | \
	v	v	v
1.	**0^0 = 0**	0	0
2.	**2^0 = 1***	00000000 = 00	1
3.	**2^1 = 2***	00000001 = 01	2
4.	....	00000010 = 10	3
5.	**2^2 = 4***	00000011 = 11	4
6.	....	00000100 = 100	5
7.	....	00000101 = 101	6
..	....	00000110 = 110	7
9.	**2^3 = 8***	00000111 = 111	8
..	....	00001000 = 1000	9
..	....	00001001 = 1001	10
..	....	00001010 = 1010	11
..	....	00001011 = 1011	12
..	....	00001100 = 1100	13
..	....	....	...
17.	**2^4 = 16***	00001111 = 1111	16

..	....	....	...
33.	**2^5 = 32***	00011111 = 11111	32
..	....	....	...
65.	**2^6 = 64***	00111111 = 111111	64
..	....	....	...
129.	**2^7 = 128***	01111111 = 1111111	128
..	....	....	...
257.	**2^8 = 256***	11111111 = 11111111	256

Note: The equations marked with an asterisk are of primary concern in the IP Specifications relating to IPv7 and IPv8. And it can be concluded from "Logic of the Method of Quantification", that every Binary Number derived, which represented as all '1's', is the Fundamental Principle of the Binary System. In other words; " 2 x 2 = 2 + 2 ".

In fact, it is from the conclusion deduced above, and that which the Concept of Exponential Enumeration maintains, which will ultimately cause a change not only in the method of enumeration in Binary Mathematics, but the whole of the Theoretical and Applied Biological and Physical Sciences as well. Which clearly provides, an explanation for the creation of the Synthetic Process called 'BITWISE ANDING'. In fact, it could be argued, this Method is derived from the Process of Truth Table Analysis, which sustains the unquestionable similarity. That deals with Pure Logic, and not the numerical values of the IP Address Range. Where by, its use provided a functional means, which compensated for the Enumeration Errors inherent in the Binary System. In addition to the fact that, in Truth Table Analysis there is less overhead, because there is far less calculation involved than in the process of Binary Subtraction. Nevertheless, it should be understood that, the foundation of this Process is based upon the 'Concept of Differentiation, which is clearly Derived from the concepts as established in '13a', noted above.

In other words, it can be concluded that, the IP Address Range equals a total of 256 IP Addresses, which represents the inclusive count established by the Range '1 - 256', because the Integer '0' is not defined as an Element of the Binary Set. Furthermore, it should be understood that, Zero maintains the same functional purpose, regardless of whether or not its consideration is Binary or Integer. However, since there is No Actual Binary Representation for Zero, indicating the Empty Set, as such. Then consideration must be given, as to provide some distinction between the two representations. In this case, I would advise the use of '00' as indicating All Binary Zeros (which equals the Positive Integer '1'), and the use of '0' (The Integer Zero) to represent the Integer value. Beyond this however, it should be clearly understood, all other uses of "0", maintain its distinction by definition from the assigned Mathematical System which employs its use.

Nevertheless, these changes and resolutions of the errors plaguing IPv4, established the foundation for the logical derivation of IPv7 and IPv8, which is incorporated in the succeeding Chapters. Moreover, it is from these discoveries and the results they yield, which provides the necessary and final distinction that will server to establish IPv7 and IPv8, as a New IP Specification.

Chapter II: An Overview of IPv7

The logical replacement for IPv4 is IPv7, because the method of Enumeration used in its IP Addressing Schematic is identical, and it provides a greater adherence to the rules of a logical system having an underlying mathematical foundation. Furthermore, while there exist stark differences, which are the Structural modifications to its IP Addressing Schematic. It can nonetheless, be used in place of IPv4, without any change in the foundational applications or associations presently in use, except where the error corrections mandate. In other words, all of the grounding principles, associations, and applications that are an integral part of IPv4, are the same in IPv7.

Nevertheless, the results from Chapter I and the analysis of Tables 4, 5, and 6, which includes the concepts of Supernetting. Produced the results, which provide the logical justification and derivation of the results of Table 9.

Table 9.

" The Reality resulting from Supernetting, the combination of TABLES 4 and 5 yields a Total of '4.145 x 10^9' available IP Addresses"

Class A, 1 - 126, Default Subnet Mask 255.x.x.x:
126 Networks and 254^3 Hosts: 0
Total Number of IP Addresses Available:
126 x 16,387,064 = 2,064,770,064

Class B, 128- 191, Default Subnet Mask 255.x.x.x:
2^6 Networks and 254^3 Hosts: 10
Total Number of IP Addresses Available:
64 x 16,387,064 = 1,048,772,096

Class C, 192 - 223, Default Subnet Mask 255.x.x.x:
2^5 Networks and 254^3 Hosts: 110
Total Number of IP Addresses Available:
32 x 16,387,064 = 524,386,048

Class D, 224 - 239, Default Subnet Mask 255.x.x.x:
2^4 Networks and 254^3 Hosts: 1110
Total Number of IP Addresses Available:
16 x 16,387,064 = 262,193,024

Class E, 240 - 254, Default Subnet Mask 255.x.x.x:
15 Networks and 254^3 Hosts: 1111
Total Number of IP Addresses Available:
15 x 16,387,064 = 245,805,960

Note: While Hosts are shown to exist for Class D and E, their existence is not define in IPv4. However, this provides a clarity, which is necessary for the introduction of IPv7 and IPv8. Furthermore, this method eliminates the need to assign entire IP Address Classes for use as MultiCast or Experimental IP Addresses. Where the Total Number of Available IP Addresses in IPv4 is given as; '253 x 254^3 = 4.145 x 10^9'.

The foregoing clearly shows, without having the Default Subnet Mask Define as limiting the values of the Octet to the Address Range of the Class in which it is mapped. Then, only the Value of the First Octet in any IP Address can determine the IP Address Class of which, the resulting IP Address might belong. This means that, the Total number of IP Addresses available is equal to the Binary Bit Count of the Address Range multiplied by the Host Bit Count, 2^24. That is, every Class can maintain the Default IP Address as given for the Class A, which justifies the Expansion as given in Table 10.

Table 10.

"The Logically derived Structure of the 'Synthetic' Decimal Representation of the IPv7 Class System"

CLASS A

1. **Class A-1, 1 - 128, Subnet Identifier 256.Y.X.X:**
   Class A-2, 1 - 128, Subnet Identifier 256.256.Y.X:
   Class A-3, 1 - 128, Subnet Identifier 256.256.256.Y:
   Class A-4, 1 - 128, Subnet Identifier 256.256.256.256:

2^7 Networks and 256^3 Hosts: 0
Total Number of IP Addresses Available:
128 x 16,777,216 = 2,147,483,648

CLASS B

2. **Class B-1, 129 - 192, Subnet Identifier 256.Y.X.X:**
   Class B-2, 129 - 192, Subnet Identifier 256.256.Y.X:
   Class B-3, 129 - 192, Subnet Identifier 256.256.256.Y:
   Class B-4, 129 - 192, Subnet Identifier 256.256.256.256:

2^6 Networks and 256^3 Hosts: 10
Total Number of IP Addresses Available:
64 x 16,777,216 = 1,073,741,824

CLASS C

3. **Class C-1, 193 - 224, Subnet Identifier 256.Y.X.X:**
Class C-2, 193 - 224, Subnet Identifier 256.256.Y.X:
Class C-3, 193 - 224, Subnet Identifier 256.256.256.Y:
Class C-4, 193 - 224, Subnet Identifier 256.256.256.256:

2^5 Networks and 256^3 Hosts: 110
Total Number of IP Addresses Available:
32 x 16,777,216 = 536,870,912

CLASS D

4. **Class D-1, 225 - 240, Subnet Identifier 256.Y.X.X:**
Class D-2, 225 - 240, Subnet Identifier 256.256.Y.X:
Class D-3, 225 - 240, Subnet Identifier 256.256.256.Y:
Class D-4, 225 - 240, Subnet Identifier 256.256.256.256:

2^4 Networks and 256^3 Hosts: 1110
Total Number of IP Addresses Available:
16 x 16,777,216 = 268,435,456

CLASS E

5. **Class E-1, 241 - 255, Subnet Identifier 256.Y.X.X:**
Class E-2, 241 - 255, Subnet Identifier 256.256.Y.X:
Class E-3, 241 - 255, Subnet Identifier 256.256.256.Y:
Class E-4, 241 - 255, Subnet Identifier 256.256.256.256:

15 Networks and 256^3 Hosts: 1111
Total Number of IP Addresses Available:
15 x 16,777,216 = 251,658,240

Note: The Equation for Determining the IP Address Range for any IP Class is; (REN - RBN) + 1 = Total of Available IP Addresses for the given Class. (Where R = Range, E = End, B = Beginning, N = Number).

However, the resulting expansion, that is IPv7, as summarized in Table '10' raises an issue, while not a major problem. It does indeed, represent a Mathematical Conflict within the IPv7 Class Addressing Scheme, as depicted in Table 10. Where by, the Mathematics Analysis reveals that the Second Octet of the Primary Section of Each Class maintains a Set of Values within each of their respective IP Address Ranges. Which can not be employed or used as part of the count resulting in the total number of available IP Addresses. This is because they are not available as a valid IP Address, and if they were, then there would exist a mathematical conflict with the calculation of the total number of available IP Addresses for Every Section Succeeding the Primary Section of each IP Address Class.

In other words, there would arise an error in reporting the results of the calculated totals. This can easily be visualized when compared with the results of the second Octet of the Secondary Section for each of the IPv7 Class Address Ranges. That is, there exist a barrier imposed by the use of the Subnet Identifier in every Octet Succeeding the Primary Section of each IPv7 Class Address Schemes, which bars the use of any of the numbers given by the IP Address Range for that given IP Address Class. This is seen true, because the 1 - 256 = 256 is the inclusive total. However, the current definitions excludes the use of all Binary 1's and Integer 0's from use in the Network portion of the IP Address. Which also includes the Host Count, whose total is equal to '256 - 1 = 255'. Nevertheless, because '0' is an Integer, it is not a Binary Representation, nor is it included in the IP Address Count. Which does indeed contain all of the numbers available to be used as IP Addresses. Needless to say, this does not cripple the IPv7 Class Addressing System.

Where by, the calculation of the mathematical difference between every Division / Section for each IP Address Range within every Address Class can realized, logically, which would justify the existence for the results given by Table 10. This is especially true, since the correction of the error in the Binary System, as well as the IP Addressing Scheme are found upon the Logic of the Method of Quantification. However, this does require a further analysis, which provides a distinction, governing definitions and Laws describing the function and use of the 'Default Subnet Mask', the 'Subnet Mask', and the 'Subnet Identifier'.

Nevertheless, the results from these definition and Laws, it shall be concluded, are conformance with the logical conclusions as derived from the analysis provided in Chapter I. Which will be viewed as a modification of some of the definitions employed in the current system. Where by, 'Table 6a' changes the conditions outlined in 'Table 6', regarding the 'All Binary 0's, to the Integer '0', because the 'Binary 0', it was concluded as having a Positive Integer value of '1'. In other words, the Binary Set has No

Numerical Value(s), and there is No Binary Representation for the Null Set.

TABLE 6a

1. The Network Address portion of an IP address, as Represented by the 'Subnet Identifier', cannot be Set to either 'All Binary Ones' (256) or 'All Integer Zeros'(Which also Bars there use in the Zone IP and the IP Area Code portion of an IP Address: See Chapter IV)

2. The Subnet portion of an IP address, as represented by the 'Subnet Mask', cannot be Set to either 'All Binary Ones' or 'All Integer Zeros'

3. The Host portion of an IP address, characterized as not Being defined by either the 'Subnet Identifier' or the 'Subnet Mask' cannot be Set to 'All Binary Ones' or 'All Integer Zeros'

4. The IP address 127.0.0.0* can never be assigned as a Network Address, because is the 'LoopBack' test IP Address. Which is the only IP Address, other than 'Emergency BroadCast IP Address', allowed to use 'All Integer Zeros' in the Host portion

*Note: All Binary 0's equals the Positive Integer '1'. And following the suggestion from the Abstract, (4) noted above becomes, 127.0.0.0, which is the only value assigned to the LoopBack Address, because All Integer Zeros has no effect upon the IP Address Total and it is not a Member of the Binary Set.

Definitions

1. The Subnet Identifier defines the Default Subnet Mask and the Octet, which can only be assigned the values specified by in the IP Class Address Range within boundaries of IP Address Class in which it is used.

2. The Default Subnet Mask has a Binary value of 11111111 and a Decimal value of 256, it is used calculate the IP Network Address and to map the location of the Network portion of the IP Address defined by the Subnet Identifier.

3. The Subnet Mask is used to divide any Parent Network IP Address into several smaller and Logical Sub-Networks. When used in conjunction with the Default Subnet Mask, it identifies the resulting Sub-Network IP Address it was used to create.

Nonetheless, the analysis of mathematical procedures for the elimination of this discrepancy is achieved by definitions resulting from the Laws of the Octet, which are summarized in Table 11.

TABLE 11

{" The Laws of the Octet "}

'If the "Subnet Identifier specifies the value for the Variable Y", then the "Subnet Identifier" is said to Define the value of every Octet, for All Address Classes, in which the 'Y' variable is assign': Hence;

1. **By definition, there exist 4 distinct Sections or Divisions for every IP Address Class. However, the number of Sections** or Divisions that any IP Address Class can maintain is Mathematically derived, which is related to, and dependent upon, the IP Bit Address Number and the Total Number of IP Addresses defined for the IP Address Classes.

2. **The Sections or Divisions of the IP Address Class are defined as: Primary, Secondary, Ternary, etc...And are labeled** according to their respective Class Location (e.g.: Class A would be Class A-1, Class A-2, Class A-3, and continued as would be necessary to distinguish every Division(s) of the Class, and the respective Divisions of the remaining IP Address Classes; i.e. Address Classes B - E).

3. **The Subnet Identifier assigns to the First Octet within each Section or Division of every IP Address Class, when it is not** use as the Default Subnet Mask, only the value of the numbers available in the IP Address Range assigned to the IP Address Class.

4. **Every OCTET, in every Address Class, which is not defined by the Subnet Identifier, can be assigned any value defined** by the range given by; '1 - 256' (which excludes the use of All Integer '0's'). That is, provided that there is no succeeding Section or Division within the same Address Class, whose reference would be the same OCTET Number, which is Defined by the Subnet Identifier. (In other words, if there is such an OCTET in the succeeding Section or Division, then neither, can be defined by the Subnet Identifier and use All of the Numbers in the Integer Range specified above.)

5. **For every OCTET within each Section or Division of every IP Address Class, that is defined by the Subnet Identifier, and** it is preceded by a Section or Division within the same Address Class, whose reference is the preceding Octet Number. Then, the Octet of the preceding Section or Division must be

defined by the Subnet Identifier. (Because with the exception of the First Octet, the Octet of the preceding Section, or Division, must be defined by 'Y', and can NOT be assigned the value denoted by the Integer Range, which DEFINES the IP Address Range assigned to that IP Address Class.)

Needless to say, this situation can be further explored, provided that, it is understood that the Total Number of available IP Addresses for Class A, is equal to, 2,147,483,648 = 128 x 256^3. That is, if given Class A, as our example, then from the Mathematical analysis of Sections A-1 and A-2, we have:

1. Class A-1, 1 - 128, Subnet Identifier 256.Y.X.X:
   128 Networks and 256^3 Hosts: 0

2. Class A-2, 1- 128, Subnet Identifier 256.256.Y.X:
   128^2 Networks and 256^2 Hosts: 10

Note: The Host value is within the Range of the equation '1 - 256 = 256', the result of '256 - 1 = 255' , which is a Variable equal to the inclusive total yielding '255'. (See Table 6a)

Nevertheless, the examination of these classes yields the conclusion:

'That the total number of available IP Addresses for each Division or Section, within any given Address Class, must equal the total number of IP Addresses available for the given Address Class'.

Therefore, if Class A-1's second Octet were to maintain any of the Values in the IP Address Range, '1 - 128', then it would be reporting IP Address of Class A-2 because the second Octet of this Class is defined by the 'Subnet Identifier'. However, the easiest mathematical method for the determination of the total number of available IP Addresses for any Division within any Address Class, would be to calculate the total number of IP Addresses available from its DEFAULT IP Address Structure, as given above, and defined by the Laws of the Octet.

Hence, the total number of IP Addresses available to any Section or Division of any Address Class is the product of the IP Address Range value, as determined by the Subnet Identifier, and the assigned IP Address of the remaining Octets, which is a function of the Laws of the Octet. In other words, the total number of IP Addresses available for any given Address Class, must be equal to the sum of the total number of addresses in each section or division comprising that Class. In which case, our example would yield:

3. Class A-1, 1 - 128, Subnet Identifier 256.Y.X.X:
   (128 x 128 x 256 x 256) = 1,073,741,824 Network IP's
   {Where Y = the value of the Range of the Octet,
   which precedes the Octet defined by the Subnet
   Identifier = '256 - 128 = the Range 129 - 256'.)

   And

4. 128 x (255)^2 = 8,323,200 Hosts: 0
   (This complies with the Rules in
   Table 6a.)

Where the determination of the Number of available Host IP Addresses æFor AllÆ Classes, is given by the equation 5.

5. T x 255^N = Host IP Address Count

This is valid, because 127 can be used in Class A, given that 'T' is equal to 'IP Address Range Inclusive Total', and 'N' equals the number Remaining Octets, which are not defined by the Subnet Identifier. Which means that the number of available Host IP Addresses in the 'Last Octet' of the Last Section or Division of each IP Address Class is equal to the Inclusive Total of the Number of IP Addresses available in the IP Address Range. Hence, the total number of available IP Addresses, in this example, for the Class A would be that given as:

6. 128 * 256^3 = 2,147,483,648

In other words, equation 6 represents the total number of available IP Addresses in the Class A, and equation 4 represents the total number of Hosts available to each network IP Address assigned to Class A-1. Furthermore, it should be understood from the Laws of the Octet, that the total number of available Network IP Addresses assigned to Class A-1 is given by equation 7:

7. $128 \times (256 - 128) \times 256 \times 256 = 1{,}073{,}741{,}824$

This method is summarized in Table 12. Where the results of equation 7 equals the total number of IP Addresses available for assignment as a Parent Network in a Global Internetworking Environment, and the results of equation 4 yield the number of Hosts that can be repeatedly assigned and used as private Domain Network IP Addresses. In which case, one would need to access the Parent Network to have access to any of these internal private Networks and Hosts identified by these IP Addresses. Thus, there would be no conflict from their continued use, which is the process now employed.

NOTE: So not to violate the Laws of the Octet. It should be clearly understood that the last section of every Class can only be represented by the Default Address given by: 256.256.256.yyy. (Where y = is the difference given by the equation: "Y = 256 û Q {Where Q = IP Address Range for the given Address Class}". Where the total number of available Hosts, when Class A is the given example, then the last section, Class A-3 is given by:

8. Q = 256 - Y = 256 - 128 = Host Count Factor = 128

Hence, the Host Count Factor, HCF, is equal to the Total Number of IP Addresses in the IP Address Range of each Address Class. Nevertheless, these results are displayed in Table 12.

9. Q = 256 - Y = 256 - (256 - 'Y') = Host Count Factor
(Where 'Y' = 256 - 'IP Class Address Range Total')

Table 12.

"Reality of the Mathematically Derived Addressing Schematic / Structure of the Decimal Representation for the IPv7 Class System." (Where the Value for the variable 'Y' is given by the Laws of the Octet, which yields 4.278 x 10^9 Addresses: And '128 + 64 + 32 + 16 + 15 = 255, which Yields 255 x 256^3 IP Addresses'.)

1. **Total IP Addresses for Class A = 128 x 256^3 = 2,147,483,648**
Total available IP Addresses for Class A = 128 x 256^3
Total available IP Host Addresses Equals 128 x 255^N
(Where N = Number of Octet, and 'Y' equals the Address Range '129 - 256', 1 - 128 is not included in the Address Range Represented by the equation 'Y = 256 - 128'.)

Class A-1, 1 - 128, Subnet Identifier 256.y.x.x:
1,073,741,824 Networks and 8,323,200 Hosts: 0

Class A-2, 1 - 128, Subnet Identifier 256.256.y.x:
536,870,912 Networks and 32,640 Hosts

Class A-3, 1 - 128, Subnet Identifier 256.256.256.y:
268,435,456 Networks and 128 Hosts

Class A-4, 1 - 128, Subnet Identifier 256.256.256.256:
268,435,456 Network / MultiCast IP Addresses / AnyCast

2. **Total IP Addresses for Class B = 64 x 256^3 = 1,073,741,824**
Total available IP Addresses for Class B = 64 x 256^3
Total available IP Host Addresses Equals 64 x 255^N
(Where N = Number of Octet, and 'Y' equals the Address Range '256 - Q'; 129 - 192 is not included in the Address Range Represented by the equation 'Y = 256 - 64'.)

Class B-1, 129 - 192, Subnet Identifier 256.y.x.x:
805,306,368 Networks and 4,161,600 Hosts: 10

Class B-2, 129 - 192, Subnet Identifier 256.256.y.x:
201,326,592 Networks and 16,320 Hosts

Class B-3, 129 - 192, Subnet Identifier 256.256.256.y:
50,331,648 Networks and 64 Hosts

Class B-4, 129 - 192, Subnet Identifier 256.256.256.256:
16,777,216 Network / MultiCast IP Addresses / AnyCast

3. Total IP Addresses for Class C = 32 x 256^3 = 536,870,912
Total available IP Addresses for Class C = 32 x 256^3
Total available IP Host Addresses Equals 32 x 255^N
(Where N = Number of Octet, and 'Y' equals the Address
Range '256 - Q'; 193 - 224 is not included in the
Address Range Represented by the equation
'Y = 256 - 32.)

Class C-1, 193 - 224, Subnet Identifier 256.y.x.x:
469,762,048 Networks and 2,080,800 Hosts: 110

Class C-2, 193 - 224, Subnet Identifier 256.256.y.x:
58,720,256 Networks and 8,160 Hosts

Class C-3, 193 - 224, Subnet Identifier 256.256.256.y:
7,340,032 Networks and 32 Hosts

Class C-4, 193 - 224, Subnet Identifier 256.256.256.256:
1,048,576 Network / MultiCast IP Addresses / AnyCast

4. Total IP Addresses for Class D = 16 x 256^3 = 268,435,456
Total available IP Addresses for Class D = 16 x 256^3
Total available IP Host Addresses Equals 16 x 255^N
(Where N = Number of Octet, and 'Y' equals the Address
Range '256 - Q'; 225 - 240 is not included in the
Address Range Represented by the equation
'Y = 256 - 16'.)

Class D-1, 225 - 240, Subnet Identifier 256.y.x.x:
251,658,240 Networks and 1,040,400 Hosts: 1110

Class D-2, 225 - 240, Subnet Identifier 256.256.y.x:
15,728,640 Networks and 4,080 Hosts

Class D-3, 225 - 240, Subnet Identifier 256.256.256.y:
983,040 Networks and 16 Hosts

Class D-4, 225 - 240, Subnet Identifier 256.256.256.256:
65,536 Network / MultiCast IP Addresses / AnyCast

5. Total IP Addresses for Class E = 15 x 256^3 = 251,658,240
Total available IP Addresses for Class E = 15 x 256^3
Total available IP Host Addresses Equals 15 x 255^N
(Where N = Number of Octet, and 'Y' equals the Address
Range '256 - Q'; 241 - 255 is not included in the
Address Range Represented by the equation
'Y = 256 - 15'.)

Class E-1, 241 - 255, Subnet Identifier 256.y.x.x:
236,912,640 Networks and 975,375 Hosts: 1111

Class E-2, 241 - 255, Subnet Identifier 256.256.y.x:
13,881,600 Networks and 3,825 Hosts

Class E-3, 241 - 255, Subnet Identifier 256.256.256.y:
813,375 Networks and 15 Hosts

Class E-4, 241 - 255, Subnet Identifier 256.256.256.256:
50,625 Network / MultiCast IP Addresses / AnyCast

The Rules given in Table 6a and Table 10 (Laws of the Octet) Limits the Range for the Value of the Variable 'Y' and 'X'. That is, when 'X' = 'Y' or 'X' = '256', which represents only the IP Address Count, then the Range of Values that 'X' or 'Y' can be assigned is governed by the Laws and Rules noted above. Which encompasses the Range given by '1 - 256', inclusive. These principles can be expressed mathematically, given that it is understood that the Total number of available IP Addresses per unit of Division of the Address Classes of IPv7, can not be greater than the Total number of available IP Addresses as would result from any calculation used to determine this total without such a division. In other words, the Total Number of Available IP Addresses for every Address Class, can not be greater than any sum, representing a division of this total, which implies an equality between the whole and its constituents. This concept is given by equation 10.

10. {A | A = Z in 256.X.X.X, and 256.X.X.X is the format which results from this process. Where, in all situations the expression 256.X.X.X represents the equation 256 * X * X * X, which equals some value that indicates the Total Number of IP Address for a given Address Class, then the total number of Addresses for any given Division of this Class is to the Sum of there Totals: [A + B + C + D + E].

Hence, the total number of available IP addresses in IPv7, which comprise several divisions, is equal to the Sum of the total number of IP Addresses that exist in each Division. That is, if and only if, there exist no condition such that, there is a violation of the Laws of the Octet.

Nevertheless, the demand for logical continuity commands that the Host Count for All Sections or Divisions follow the same provisions as outlined for every Section or Division of each Class. In other words, the logical format from which the creation of the Host portion in every division, for each Class, is derived from the laws of the Octet. This process allows creation of Host for the first 2 divisions, which is not a function of the total number of available IP Addresses, as given by their respective IP Address Totals. However, preserving the logical continuity, which is derived directly from the 'Laws of the Octet'. The analysis maintains, that the total number of Host, as derived for the last division of each Class, is equal to the Total Number of IP Network Addresses as would be assigned to the Class itself. And while this process might appear inconsistent with the methods for deriving the total number of available Hosts in the first 2 divisions. However, it should be understood from the analysis, that this is a 64 Bit System, which only uses 48 Bits. What this implies, is that, the method used in the last section is the same method used throughout the Class, as would be the case if there was another section, which followed, that which is now the last section.

Nevertheless, from the analysis it should be clearly understood that the features of Supernetting did not eliminate the IP Address Classes. In fact, the analysis showed not only an increased in the total number of available IP Addresses it provided, but a Class System, which remained intact as well. Needless to say, the claim of an aesthetic appeal to make the Class C Addresses inviting to businesses, provided more than a mere change in the schematic of the IPv4 Address structure. However, these benefits, while significant for distribution IP Addresses did nothing regarding the errors.

In other words, IPv4 offered approximately 3.12 * 10^9 IP Addresses, and Supernetting increased the number of available IP Addresses to Approximate 3.64 * 10^9, with the claim of the elimination of the Class System of Addressing. However, the implementation of a Logical Structure and the errors corrected, IPv7 provided another increase in the count of the total number of IP Addresses available. In fact, the provisions encompassing the IPv7 Addressing System, provides a more efficient use of the available IP Addresses, which is not only more stable, but less redundant than the highly taunted IPv6. Furthermore, while there exist a Binary Representation depicting the results from the Supernetting of IPv4. It should be clear, that there is no such representation for IPv7, which is a benefit that prevents confusion between the Binary and Decimal methods of enumeration.

Nonetheless, is summarized in Table 13 and 14 respectively. Where Table 14 is indeed correct, but a comparison of Table 14 with that of Table 12, clearly shows the impossibility of its existence, which does not maintain a translation.

Table 13.

"The Reality resulting from Supernetting,
the Binary Representation"

Class A, 1 - 126, Default Subnet Mask 255.x.x.x:
126 Networks and 2^24 Hosts: 0

Class B, 128- 191, Default Subnet Mask 255.x.x.x:
2^6 Networks and 2^24 Hosts: 10

Class C, 192 - 223, Default Subnet Mask 255.x.x.x:
2^5 Networks and 2^24 Hosts: 110

Class D, 224 - 239, Default Subnet Mask 255.x.x.x:
2^4 Networks and 2^24 Hosts: 1110

Class E, 240 - 254, Default Subnet Mask 255.x.x.x:
15 Networks and 2^24 Hosts: 1111

Table 14

Structure of the Resulting Synthesis of a Binary Representation
for IPv7 Class System*

CLASS A

1. **Class A-1, 1 - 128, Subnet Identifier 256.000.000.000:**
   2^7 Networks and 2^24 Hosts: 0

   Class A-2, 1 - 128, Subnet Identifier 256.256.000.000:
   2^15 Networks and 2^16 Hosts: 0

   Class A-3, 1 - 128, Subnet Identifier 256.256.256.000:
   2^23 Networks and 2^8 Hosts: 0

   Class A-4, 1 - 128, Subnet Identifier 256.256.256.256:
   2^31 Network / MultiCast IP Addresses / AnyCast

CLASS B

2. **Class B-1, 129 - 192, Subnet Identifier 256.000.000.000:**
   2^6 Networks and 2^24 Hosts: 10

   Class B-2, 129 - 192, Subnet Identifier 256.256.000.000:
   2^14 Networks and 2^16 Hosts: 10

   Class B-3, 129 - 192, Subnet Identifier 256.256.256.000:

   2^22 Networks and 2^8 Hosts: 10

   Class B-4, 129 - 192, Subnet Identifier 256.256.256.256:
   2^30 Network / MultiCast IP Addresses / AnyCast

CLASS C

3. **Class C-1, 193 - 224, Subnet Identifier 256.000.000.000:**
   2^5 Networks and 2^24 Hosts: 110

   Class C-2, 193 - 224, Subnet Identifier 256.256.000.000:
   2^13 Networks and 2^16 Hosts: 110

   Class C-3, 193 - 224, Subnet Identifier 256.256.256.000:
   2^21 Networks and 2^8 Hosts: 110

Class C-4, 193 - 224, Subnet Identifier 256.256.256.256:
2^29 Network / MultiCast IP Addresses / AnyCast

CLASS D

4. **Class D-1, 225 - 240, Subnet Identifier 256.000.000.000:**
2^4 Networks and 2^24 Hosts: 1110

Class D-2, 225 - 240, Subnet Identifier 256.256.000.000:
2^12 Networks and 2^16 Hosts: 1110

Class D-3, 225 - 240, Subnet Identifier 256.256.256.000:
2^20 Networks and 2^8 Hosts: 1110

Class D-4, 225 - 240, Subnet Identifier 256.256.256.256:
2^28 Network / MultiCast IP Addresses / AnyCast

CLASS E

5. **Class E-1, 241 - 255, Subnet Identifier 256.000.000.000:**
15 Networks and 2^24 Hosts: 11110

Class E-2, 241 - 255, Subnet Identifier 256.256.000.000:
2^11 Networks and 2^16 Hosts: 11110

Class E-3, 241 - 255, Subnet Identifier 256.256.256.000:
2^19 Networks and 2^8 Hosts: 11110

Class E-4, 241 - 255, Subnet Identifier 256.256.256.256:
2^27 Network / MultiCast IP Addresses / AnyCast

*Note: Because of the Mathematics involved, it should be clear from Table 14, that there does not exist an accurate depiction of the Addressing Schematic in the Binary Representation for either the IPv7 or the IPv8 IP Specifications.

Nevertheless, by exploiting the Default Subnet Mask, that is, understanding its real purpose as used in BITWISE ANDING. Which is IP Network Address Resolution by determining the value of the defining Octet. Then anyone could easily visualize that, the former IPv4 Class Addressing Scheme, as summarized in Tables 4 and 5, warrants the expansion to that given by Table 12. Where the Default Subnet Mask, now the Subnet Identifier, assumes the duties of its actual definition. That is, it remains the Default Subnet Mask, which when used in Bitwise Anding serves to resolve the Network IP Address. This working definition provides further justification for the acceptance of IPv7. Especially since, IPv7 while distinct, it retains the same method of enumeration, which allows it be viewed as the expansion of the IPv4 Address Class. While its structure clearly represents, the logical derivative from the change in the Default Structure defining each division of the IPv4 Class, which resulted from the use of Supernetting.

Nevertheless, Supernetting produced a change in all of the Default IP Address Structures of the IPv4 Classes, to the Default Structure as depicted for the Class A. Needless to say, this is the definitive proof, that while IPv7 is a New IP Specification, its evolution is a logical derivative founded upon changes made in IPv4, which corrects its Errors and compensates for the shortages in the number of available IP Addresses. In other words, beyond the correction of the Errors, these changes have absolutely no effects upon the foundation, which retains the same methods of enumeration. Needless to say, the inherent premises associated with any logical conclusion, would indeed necessitate the evolution of IPv7. Especially since, it not only offers a tremendous cost reduction when considering any other IP Specification, but, it also provides a solution for the shortages in the number of available IP Addresses.

Nevertheless, while IPv7 is indeed a New IP Specification, it yet retains an identity of being nothing more than a 'TRANSPARENT OVERLAY' for the IPv4 Addressing System. In which, the resounding effects of its implementation would increase the overall efficiency of IP Addressing, while leaving the underlying foundations characterizing IPv4, intact.

Chapter III: An Overview of IPv8 the Enhancement of IPv7

The over all structure and organization regarding the overview of IPv8 differs only in a minor change in the format of the IP Addressing Schematic, which is a slight distinction from that underlying IPv7. In other words, it is viewed as an enhancement of IPv7, which provides separate copies of the entire IP Addressing Scheme for distribution, as summarized in Table 12. Thus, by developing a system which allows separate copies of the entire addressing scheme to be distributed, I created an IP Specification whose functional use, efficiency, and applications provides an almost unlimited number of available IP Addresses to the Telecommunication Industries of the entire World.

In other words, the enhancement offered by IPv8 is characterized by the use and implementation of PREFIXES to the 32 Bit Block IP Address, such as; 'Zone IP' and 'IP Area Codes'. Which is a boon for the expansion of the Telecommunication Industry, because it is a Logical Derivative of IPv7. These measures guarantees the Life of the Internet, with the promise of being the only medium necessary for all of the World's Telecommunications Traffic. However, these benefits are not without a cost, or an additional burden upon the IT Industry itself.

Where by, some of the benefits incorporated in the implementation of IPv8, without a doubt, will increase the demand upon the Use and Function of the Global Internetworking System's Backbone. Even so, it still provides enough gains to offset any discrepancies concerning any performance issues. In fact, it offers a significant increase in Router performance, which yields a significant boost over the use of 'CIDR' (as shall be discussed in later chapters). And while, further impacting the Backbone Traffic, is the possibility of reducing or eliminating the need for the use of Long Distance Charges in Telephone Calls, because they could be Routed with greater efficiency via the Global Internetworking System. However, even these problems can be eliminated through the deployment of IPv8, because automated control systems can be implemented, which could quite easily govern Backbone Traffic and protect the system in the event of some, foreseen or unforeseen, catastrophic occurrence.

Nevertheless, the advantages offered by this IP Specification, even transcends the barriers of language, because it is possible to route within an IP Area Code, or to a Zone IP, to Servers whose function is language Translation. Needless to say, there is no end to the benefits: Interactive Television, Live Video Telephone Systems, Video Teleconferencing, Live Medical Diagnosing, etc., etc., etc. All while spawning the Intellectual Revolution of the Information Age, that this Global Telecommunication System and the Social Interactive Community it has established, allows everyone having a telephone today, the opportunity to participate. In other words, with the implementation of IPv8, every electrical signal or analog communication, which can be Digitized, can use the Internet as its thoroughfare.

Chapter IV: 'The Header Structure and the Decimal Representation Of IPv8'

The IP Addressing Scheme of IPv7 can serve the Global Internetworking Community now. Its implementation offers the most significant Improvements ever conceived, well beyond any planed replacement system, or those presently in use. However, while there is a learning curve, it would actually impose no challenge for the seasoned professional. In fact, there are 'SEVEN' reasons that support its implementation and the reality of it being the logical replacement for IPv4.

1. It maintains the Identical methods of enumeration for IP Addressing, as in IPv4, with a guarded respect for error correction(s).

2. Its Header does not change from that used in IPv4, which means the version number can remain the same.

3. It is only a 'Transparent Overlay' of the present Addressing System, which provides an increase of more than 133 million additional IP Addresses.

4. It is a Logical Derivative of the IPv4 Addressing System, which eliminates all of the 'PREDEPLOYMENT' testing required of a New System, all while providing a flawless transition for its expansion, IPv8. Which makes the implementation of IPv7 and IPv8 cost effective.

5. It Increases the Efficiency in the use of IP Addresses, because there are Absolutely No IP Addresses wasted on Host assignments in any of the Divisions or Sections of the respective IP Address Classes. But! Any Mathematical Analysis however, would clearly show that the Difference between the noted IP Address Loss in the 'Abstract' above (16,777,216), and total Number of Host IP Addresses (16,581,375), represents a further reduction of the Total Number of reported IP Address Losses in the IPv7 IP Specification, to approximately 195,841 Addresses. In other words, the number of available Hosts IP Addresses determined by 'Laws of the Octet', is always a 'Constant', and provides an unquestionable Efficiency in the use of the Total Number of Available IP Addresses for the IPv7 IP Specification*.

6. There is no Mandate Requiring Any Change to The Current Structure of the Private Networking Domains, nor to their Existing IP Addressing System or Format, which would extend beyond providing the Users with an additional convenience. In other words, asides from the Requirement for Changing the numbering and Naming of 'Default IP Subnet Mask' used in the DNS Server, and DHCP Servers, implementing these changes, which results from the change in the Binary System, would be all that is needed. Especially since, other than the Operating System itself, these changes would provide all the consideration as would be needed by the Applications the individual systems might contain.

7. The existence of the Use of the Integer '0', except for the use in EMERGENECY BROADCAST COMMUNICATION. Which means, the Integer '0' would be excluded from any use involving any Normal IP Addressing Format. Thus, barring it from the use in any Octet of the IP Address, except in an Emergency. However, this is a special case, and an important function of the Integer '0', which is beyond the limits imposed that Bars its (ALL Integer 0's) use in the 'Zone IP', 'IP Area Code', and the Octet(s) Defined by the 'Subnet Identifier'. In other words, this requirement prohibits All Network Administrators, Except those Responsible for Administrating the EMERGENECY BROADCAST COMMUNICATION Network, from the use or assignment of All Integer '0' to any Octet within an IP Address. And this does not effect nor alter the number of available of IP Addresses for use in the IPv7 and IPv8 IP Addressing Specification, nor its use in defining the 'Default Subnet Mask'.**

*Note: This conclusion is valid for the IPv8 IP Specification as well, because IPv8's Default, or Base, IP Addressing Schematic is identical to IPv7, which differs only in its use of the Zone IP and IP Area Code Prefixes. And it is through the use of Prefixing the IPv7 IP Specification, that accounts for the Staggering number of available IP Addresses in the IPv8 IP Specification. Nevertheless, this is a Hidden benefit, which can not be Translated into the IP Address Count for the Total Number of Available IP Addresses in the IPv7 and IPv8 IP Specifications, because there is no an actual increase. That is, the calculated loss of 195,841 IP Addresses results from the Host Count, which is determined by the Definitions outlined in Table 6a.

**Note: This, in essence would reverse the Definitions of All Binary '1's', '256', as Broadcast, to mean "this Network only". In which case, any Octet containing All Integer '0's', where the Zone IP, IP Area Code, and 'Subnet Identifier' are permanently excluded, would be reserved for "[Emergency] Broadcasts only; and LoopBack Address".

In other words, IPv7 is a system that can be used now, which provides the ease of use and implementation of IPv4. While at the same time, IPv7 provides an almost seamless transition for its enhancement, IPv8. Furthermore, these protocols could represent the END of the DHCP Server, because other than considerations for IP Address mapping to a 'Name', or the facilitation it provides in making IP Address assignment an automatic process, there would be No need for assigning a temporary IP Address. Which does ultimately suggest, Re-Defining the functions for a DHCP Server. Where by, the New specification would provide the complete Specifications and Capabilities for Sub-Net Creation, that would allow Variable Sizing. It must also be capable of Suggesting, or Specifying the Number of IP Addresses Allocated for creating the Sub-Net, which would use the 'Gateway Router's Permanente IP Address' as the 'Point of Demarcation' to Assign an IP Address from the 'Sub-Net Pool' to every Device which is attached to the Sub-Net. In addition to Sizing and Maintaining the Reserve (Surplus) IP Address Pool, and also maintaining a Permanente Server IP Address Assignment. The New definition for the 'DHCP Server' would also incorporate all of the functions, which would be necessary to allow any person to Design and implement a Network of any Size. Moreover, this specification must also included 'IP PBX' suffixing Capabilities. That is, the specification for Enabling the Trailing Numbers ('1 - 999') ':X.X.X', which are attached to the End of an IP Address, that would provide the Services for 'VVoIP' (Video & Voice Over IP), using only the Router to Direct the Communications to the Right Sub-Components in a 'Session Initialization Protocol' Environment. And to complete the set-up for Network Operations, the 'DHCP Server' must also establish, and verify, the final LAN, WAN, or MAN (etc...) Connections.

Nevertheless, while IPv7 is called the "Global Internetworking Community Standard", IPv8 is called the "Global Telecommunication Standard". The difference however, distinguishing these systems, are two fold. Where by, the former is a shared IP Addressing System, which utilizes the Network medium for limited communication. However, the latter represents a Global Standardization for all Telecommunications Systems in use today.

The advantages of IPv8 however, surmount far beyond any 32 Bit IP Addressing System now employed, or any IP Addressing System ever conceived. Nevertheless, while retaining the ease of use and implementation of IPv4 / IPv7, IPv8 provides an additional number of available IP Addresses that's staggering, to say the very least. In other words, the comparable analogy would be, IPv7 can provide an individual IP Address to 'nearly' every person in the world today. While IPv8 presently, using only 48 Bits of this 64 Bit IP Addressing System, can sustain the inhabitants of more than '46 Thousand Planets'. And if the total Address Range of this 64 Bit System is used, then IPv8 can provide an individual IP Address to the inhabitants of more than '3 Billion Planets', with each planet having a population equal to the population total of the world today. Which is to say, if IPv8 were expanded to the same Address Space as IPv6, which is a 128 Bit IP Address. Then the total number of available IP Addresses would be greater than 3.402 x 10^38. Which is greater than the available IP Address offering of IPv6. In other words, what this means in the terms of the foregoing scenario, is that: 'The people of planet Earth can, when using the 128 Bit IP Addressing format of IPv8, colonize more than 5.36 x 10^28 Planets, with each Planet having a population total equal to the existing count, and still have reserve IP Addresses'.

[5.36 x 10^28 = 53,600,000,000,000,000,000,000,000,000 Planets! And guess what?...A Light Year Distance is only 5,873,960,000,000 miles!]

Furthermore, while the foundations underlying IPv8 (it's Base), is the same as that given in IPv7, which indicate its cost effectiveness, because it does not require any pre-deployment testing. There is indeed another distinction between these systems, which provides an accountability regarding the method to increase, what is clearly, a staggering number of available IP Addresses. The difference, while similar to IPv6, is the change in the structure of the IP Header associated with IPv8, and their depiction is given in Figure 5.

Figure 5

IP Header for IPv4 and IPv7

```
0                   1                   2                   3

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
| VER  |  IHL  | TYPE OF SERVICE |  TOTAL LENGHT                |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| IDENTIFICATION                 |FLA|    FRAGMENT OFFSET       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|  TIME TO LIVE  |  PROTOCOL   |      CHECK SUM HEADER          |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                          SOURCE ADDRESS                       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                   DESTINATION   ADDRESS                       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                             OPTIONS                           |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                             DATA                              |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|---------------------------------------------------------------|
```

IP Header for IPv8

```
0                   2                   4                   6
0 2 4 6 8 0 2 4 6 8 0 2 4 6 8 0 2 4 6 8 0 2 4 6 8 0 2 4 6 8 0 2
| VER  |  IHL  | TOS & NEXT HEADER |   TL & DIRECTION BIT       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| IDENTIFICATION & SECURITY BIT  |FLA|    FRAGMENT OFFSET       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| TTL & HOP LIMIT  |  PROTOCOL   |      CHECK SUM HEADER        |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| S RESERVED   | S RESERVED  | S IP ZONE CODE |S IP AREA CODE   |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                          SOURCE ADDRESS                       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| D RESERVED   | D RESERVED  | D IP ZONE CODE |D IP AREA CODE   |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                   DESTINATION   ADDRESS                       |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                             OPTIONS                           |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
```

```
|                          DATA                          |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|--------------------------------------------------------------|
```

Note: TTL and Hop Limit are program functions related to the Router's Table. And the Security Bit is a 2 Bit representation of some combination of 1, and 0. Where a '1' in the first bit tells the Router to route as a Direct Connection, and a '1' in the second Bit tells the Router that the transmission is Encrypted. While Type Of Service remains unchanged and Next Header is a 1 Bit indicator, being either a '1' or a '0'. And the Total Length remain the same, but the Direction Bit of either a '1' or '0' tells the Router if the Packet is an InterCom or OuterCom communication, which would assist the FireWall in Blocking Illegal Attempts to Access Private Domains.

IP Header for IPv6

```
0                   40                  80                  128
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
| VER  | PRIO. |               FLOW LABEL                      |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| PAYLOAD LENGTH               |   NEXT HEADER   | HOP LIMIT  |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|-------------------------------------------------------------|
|                                                             |
|                                                             |
|                                                             |
|                          SOURCE ADDRESS                     |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|-------------------------------------------------------------|
|                                                             |
|                   DESTINATION   ADDRESS                     |
|                                                             |
|                                                             |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|-------------------------------------------------------------|
|+ + + + + + + + + + + + + + DATA + + + + + + + + + + + + + + |
|-------------------------------------------------------------|
```

Nevertheless, it is quite obvious, that a detailed analysis of the Headers yields, the Headers for every IP Specification maintain arbitrary definitions depicting their operation. In fact, only the IP Address boxes maintain any real significance, because everything else in the Header is a matter of choice. Needless to say, the addition of the Security Bit in the Identification Section of IPv8's Header, would serve to control IP Stripping, Encryption, Secure Connections, and provide a more Direct Routing of the Communications Packet. In other words, by allowing the Headers to maintain an almost arbitrary choice in the definitions that implement the Control Functions, which determine how a Router might handle a Communications Packet. Through the use of Smart (Computer Controlled) Routers, the definitions outlining the Control Functions can become 'Multi -Purpose', which would ultimately provides greater control of the Communication Packets and render the advantage necessary to enhance performance.

Nevertheless, the actual Benefit described above, is that which allows IPv8 to have the increase and functional purpose, which underlies the staggering number of IP Addresses it provides, and the associated techniques it employs. Where by, the over all structure of the IPv8 Header of figure 5 is similar to that of IPv6, except that it 'Divides' the Source and Destination Sections of IPv6's Header Structure. However, its defining purpose is the similar as that given for IPv7. The distinct on however, is the addition of two additional sections, one for the Source and the other for the Destination. These additions make provisions for a greater individual use and deployment of this IP Addressing Scheme.

In addition, above the Source Address Section there is another 32 Bit Section, which is divided into 4 distinct and separately defined Octets. In which, there are 2 Octets reserved for growth and expansion, and another is defined as the Source Address Zone, while the last is defined as the Source IP Address Area Code. The Destination Address Section also has an additional 32 Bit section, which maintains comparable assignments, excepting that, they are defined for the Destination Address Section.

Nevertheless, the numbering system employed for use in these sections is defined as being 8 BIT Sections that employ the same methods of enumeration governing IP Addressing. However, the difference maintained in the overall IP Address Structure allows each individual IP Address Section to be Routable, which is same as that governing the 32 Bit IP Address. The significance of an 8 Bit Routable IP Address, is indeed that which gives IPv8 its superiority over any other System of Addressing. Furthermore, while the advantages of Routing an 8 Bit IP Address are enormous, this is not a System that could be employed for use in the entire IP Address format. And while, the latter can not be concluded or deduced from the Header diagrams of figure 5. It should be pointed out, that the hierarchical structure defining either the methods of Routing or

Networking, itself, could not be maintained if all of the 32 Bit IP Address of IPv8, were routable as 8 Bit Sections.

Nevertheless, figure 6 outlines the Mathematically Derived 'Default IP Address Structure' that is used in IPv8, which employs IPv7's Addressing Schematic as its Default, or Base Addressing Format. Which is also Prefixed by the Zone IP and the IP Area Code IP Addresses, and designated by the Subnet Identifier.

FIGURE 6

1. Source Addressing Structure: S1-Reserved = (X.X.X):

2. Source Addressing Structure: S2-Reserved = (X.X.X):

3. Source Addressing Structure: 256:256:256.256.256.000

4. Destination Addressing Structure: D1-Reserved = (X.X.X):

5. Destination Addressing Structure: D2-Reserved = (X.X.X):

6. Destination Addressing Structure: 256:256:256.256.000.000

Nevertheless, figure 6 depicts the 'Default IP Address Structure' for the Primary, Secondary, Ternary, and Quaternary IP Address Divisions / Sections for each of the 5 IP Address Classes, and the respective IP Address Prefixes (i.e. Zone IP and the IP Area Code) for the Source and Destination Addresses contained in the IP Header for IPv8. Furthermore, each depiction of the 'Zone IP' and 'IP Area Code' sections of the IP Address are separated by a Colon (:), which not only indicates their distinction, order of precedence, but the way in which they would be Routable as well. Now observe the Structure, as given in Table 15, that this IP Addressing Scheme yields, and compare its results with that of Table 12. Which is the Base / Default Addressing Foundation of IPv7, from which it was derived.

Table 15.

"Reality of the Structure of the Decimal Representation for the IPv8 Class System."(Where the Value for the variable 'Y' is given by the Laws of the Octet, which yields 2.78 x 10^14 IP Addresses.)*

1. Total IP Addresses for 'Class A' having '255' 'Zone IP' Addresses

= 255 x 255 x 128 x 256^3
= 255 x 255 x 2,147,483,648
= 1.39640 x 10^14

Total Number of 'IP Area Code' Addresses per 'Zone IP' Address

= 255 x 128 x 256^3
= 255 x 2,147,483,648
= 5.47608 x 10^11

Distribution per 'Zone IP' Address yielding the 'IP Area Code' Addresses

Class A-1, 1 - 128, Subnet Identifier 256:256:256.y.x.x:
2.73804 x 10^11 Networks and 8,257,536 Hosts: 0

Class A-2, 1 - 128, Subnet Identifier 256:256:256.256.y.x:
1.36902 x 10^11 Networks and 32,256 Hosts

Class A-3, 1 - 128, Subnet Identifier 256:256:256.256.256.y:
6.84510 x 10^10 Networks and 128 Hosts

Class A-4, 1 - 128, Subnet Identifier 256:256:256.256.256.256:
6.84510 x 10^10 Network / MultiCast IP Addresses / AnyCast

2. Total IP Addresses for 'Class B' having '255' 'Zone IP' Addresses

= 255 x 255 x 64 x 256^3
= 255 x 255 x 1,073,741,824
= 6.98201 x 10^13

Total Number of 'IP Area Code' Addresses per 'Zone IP' Address

= 255 x 64 x 256^3
= 255 x 1,073,741,824
= 2.73804 x 10^11

Distribution per 'Zone IP' Address yielding the 'IP Area Code' Addresses

Class B-1, 129 - 192, Subnet Identifier 256:256:256.y.x.x:
2.20046 x 10^11 Networks and 4,194,304 Hosts: 10

Class B-2, 129 - 192, Subnet Identifier 256:256:256.256.y.x:
5.13383 x 10^10 Networks and 16,384 Hosts

Class B-3, 129 - 192, Subnet Identifier 256:256:256.256.256.y:
1.28346 x 10^10 Networks and 64 Hosts

Class B-4, 129 - 192, Subnet Identifier 256:256:256.256.256.256:
4.27819 x 10^9 Network / MultiCast IP Addresses / AnyCast

3. Total IP Addresses for 'Class C' having '255' 'Zone IP' Addresses

= 255 x 255 x 32 x 256^3
= 255 x 255 x 536,870,912
= 3.49100 x 10^13

Total Number of 'IP Area Code' Addresses per 'Zone IP' Address

= 255 x 32 x 256^3
= 255 x 536,870,912
= 1.36902 x 10^11

Distribution per 'Zone IP' Address yielding the 'IP Area Code' Addresses

Class C-1, 193 - 224, Subnet Identifier 256:256:256.y.x.x:
1.19789 x 10^11 Networks and 2,097,152 Hosts: 110

Class C-2, 193 - 224, Subnet Identifier 256:256:256.256.y.x:
1.49737 x 10^10 Networks and 8,192 Hosts

Class C-3, 193 - 224, Subnet Identifier 256:256:256.256.256.y:
1.872 x 10^9 Networks and 32 Hosts

Class C-4, 193 - 224, Subnet Identifier 256:256:256.256.256.256:
2.6738 x 10^8 Network / MultiCast IP Addresses / AnyCast

4. Total IP Addresses for 'Class D' having '255' 'Zone IP' Addresses

= 255 x 255 x 16 x 256^3
= 255 x 255 x 268,435,456
= 1.74550 x 10^13

Total Number of 'IP Area Code' Addresses per 'Zone IP' Address

= 255 x 16 x 256^3
= 255 x 268,435,456
= 6.84510 x 10^10

Distribution per 'Zone IP' Address yielding the 'IP Area Code' Addresses

Class D-1, 225 - 240, Subnet Identifier 256:256:256.y.x.x:
6.41729 x 10^10 Networks and 1,048,576 Hosts: 1110

Class D-2, 225 - 240, Subnet Identifier 256:256:256.256.y.x:
4.01080 x 10^9 Networks and 4,096 Hosts

Class D-3, 225 - 240, Subnet Identifier 256:256:256.256.256.y:
2.50675 x 10^8 Networks and 16 Hosts

Class D-4, 225 - 240, Subnet Identifier 256:256:256.256.256.256:
1.6712 x 10^7 Network / MultiCast IP Addresses / AnyCast

5. Total IP Addresses for 'Class E' having '255' 'Zone IP' Addresses

= 255 x 255 x 15 x 256^3
= 255 x 255 x 251,658,240
= 1.63641 x 10^13

Total Number of 'IP Area Code' Addresses per 'Zone IP' Address

= 255 x 15 x 256^3
= 255 x 251,658,240
= 6.41729 x 10^10

Distribution per 'Zone IP' Address yielding the 'IP Area Code' Addresses

Class E-1, 241 - 255, Subnet Identifier 256:256:256.y.x.x:
6.04127 x 10^10 Networks and 967,740 Hosts: 1111

Class E-2, 241 - 255, Subnet Identifier 256:256:256.256.y.x:
3.5398 x 10^9 Networks and 3,810 Hosts

Class E-3, 241 - 255, Subnet Identifier 256:256:256.256.256.y:
2.0741 x 10^8 Networks and 15 Hosts

Class E-4, 241 - 255, Subnet Identifier 256:256:256.256.256.256:
1.2903 x 10^7 Network / MultiCast IP Addresses / AnyCast

*Note: In other words, IPv8 represents 255^2 (65,025) copies of the IPv7 IP Addressing Schematic, in which there is only one copy assigned per IP Area Code Address. While there are only 255 IP Area Codes per Zone IP Address, and a total of 255 Zone IP Addresses that use only 48 Bits of this 64 Bit Addressing System. It amounts to a total availability of 2.78 x 10^14 IP Addresses, which forms the Base, or Default Addressing Schematic for the IPv8 IP Specification, that can be expanded to 128 or more Bits utilizing the foundation of IPv7 as its Base.

Nevertheless, it should be very clear that there exist 255 Zones IP's, that contains 255 IP Area Codes. In which each IP Area Code, is a IP Block Address, which contains an independent copy of the entire IPv7 IP Specification. This translates into approximately 4.278 x 10^9 available IP Addresses per 'IP Area Code' IP Address. Needless to say, the value of the of the IPv8 Addressing Scheme, is that, if it were employed today, its use would probably equal approximately 1/36 of the total number of IP Addresses available in 48 Bits. Where by, given our present population total, which is distributed over 7 continents, calculates to an approximate 6 Billion people. Then there would only be a need for the use of 7, from the 255 total number of Zone IP's that exist in IPv8. What this means, is that, each continent would have 255 IP Area Code Addresses for distribution, and 248 Zone IP Addresses would remain unused. In fact, this IP Specification provides for the total and complete integration of every aspect of the entire Telecommunication Industry, into the very fabric of all that which is life today. And there would yet remain, room for expansion.

Chapter V: Subnetting, Supernetting, and Routing in IPv7 & IPv8

The logical Division of a Network IP Address, the 'Whole', into several smaller 'Sub-Network Units', the 'Parts', which underline the methods of Subnetting and its derivative, Supernetting, will differ somewhat, if not significantly from the techniques presently employed in IPv4. In fact, the routing techniques described in the closing sections of this chapter, which outlines the 'Network Hierarchical Architecture' of IPv8. Requires, if not mandate, more precise definitions and laws, which establish the logical foundation for the procedures governing the Subnetting and Supernetting techniques use in the IPv8 IP Specification. However, this is not to say, nor imply, that these techniques are not applicable to IPv7, because they do indeed apply. In other words, the Laws and Definitions is a direct consequence of the conclusions derived from the preceding Chapters, which are built upon the logical derivation of a New Method for Enumeration in the Binary System.

Definitions

1. **By Definition, every IP BIT Address is divided into sections called OCTETS. And, in every IP Bit Address there must exist** at least One OCTET Defined by the Subnet Identifier. Where each Octet maintains a total of 8 Binary representations of either 1's, 0's, or any combination thereof, that can collectively be Translated into one, and only one Decimal (Positive Integer) Representation.

2. **Every Octet not defined by the Subnet Identifier, may be Defined by the Subnet Mask. Where the value of the Subnet Mask is defined** as equaling the Binary Difference that yields the Binary values represented by the Decimal Numbers; 2^7, 2^6, 2^5, 2^4, 2^3, 2^2, 2^1, and 2^0. Where the Minuend equals the 'Subnet Identifier' (256 or 11111111).

3. **Every Network IP Address may contain at least one Subnet Mask. Where the Total Number of Subnet Mask that it can have, depends** upon the Number of available Octets, and the Binary Bit Address.

4. **Every Network IP Address having an Octet defined by a Subnet Mask, can be subdivided into Multiple Sub-Networks. Where the process of** creating logical divisions of an IP Address is called 'Subnetting', and the Subnetting any IP Address, which contains only one Octet, is called 'Supernetting'.

5. **For every IP Address, having one or more Octets defined by the Subnet Identifier, and at least one which is not, defines an IP** Network Address, which can be Supernetted. Where, if any Logical Division of an IP Network Address, creates multiple IP Addresses derived from the original. Then the derived IP Addresses are called Sub-Networks of the initial IP Address, which is said to be Subnetted. This is provided that the OCTET defined by the Subnet Mask, is not defined by the Subnet Identifier.

6. **For every Octet defined by the Subnet Mask for any Sub-Network IP Address. The Octet referenced as being the IP Network Address** from which it was derived, can not be assigned any value in the IP Address Range, which the Subnet Identifier defines.

7. **The Laws of the OCTET are applied to every Octet defined by the Subnet Mask. That is, it can not be used in IP Address that would** result in a conflict with any IP Address, whose Octet is defined by the Subnet Identifier.

Where DE = the Decimal Equivalent that is also equal to the (BR) Binary Representation. That is, the Subnet Mask, can only be assigned the IP Address values summarized in the Table 7. Nonetheless, an example of this Binary Difference is given in Figure 7. Where by, given 2^8 = 11111111 = 256 is the Minuend. Then the value of the 'Subnet Mask' is equal to the value of the Difference between the Minuend and the Subtrahend, which results in the Decimal Numbers: 2^7, 2^6, 2^5, 2^4, 2^3, 2^2, 2^1, and 2^0. Summarized in Table 7, we have:

Figure 4

```
      Binary Representation                Decimal Equivalent
     /                      \               /       |       \

 1. 11111111 -     0    = 11111111     =       256   =   2^8

 2. 11111111 - 01111111 = 01111111     =       128   =   2^7

 3. 11111111 - 10111111 = 00111111     =        64   =   2^6

 4. 11111111 - 11011111 = 00011111     =        32   =   2^5

 5. 11111111 - 11101111 = 00001111     =        16   =   2^4

 6. 11111111 - 11110111 = 00000111     =         8   =   2^3

 7. 11111111 - 11111011 = 00000011     =         4   =   2^2

 8. 11111111 - 11111101 = 00000001     =         2   =   2^1

 9. 11111111 - 11111110 = 00000000     =         1   =   2^0
```

Note: It should be clear that the Binary method of Subtraction is quite different from the Bitwise Anding method used by the Default Subnet Mask to resolve an IP Address.

Nonetheless, there is a logical rationalization for the choice of the values of the Subnet Mask. Where by, the Binary Equations of Subtraction yields functional results, which has a 'Least Significant Digit', that is also the Factor use for the Translation of the Binary representation to its Decimal (Integer) Equivalent.

TABLE 7
(The Resulting Modification of Table 7 noted above)

Least Significant Bit	Binary Representation	Decimal: Equivalent	Number of Subnets	Number Hosts*
0	0	0	0	0
2^7	01111111	256 - 128 = 128,	2	128
2^6	00111111	256 - 192 = 64,	4	64
2^5	00011111	256 - 224 = 32,	8	32
2^4	00001111	256 - 240 = 16,	16	16
2^3	00000111	256 - 248 = 8,	32	8
2^2	00000011	256 - 252 = 4,	64	4
2^1	00000001	256 - 254 = 2,	128	2
2^0	00000000	256 - 255 = 1,	256*	X*

Note: The 'Asterisk' represents Values in which an account for the Rule excluding All Binary '1's', that can be maintained by a value of the 'Subnet Mask'. Here we have conclusions resulting in an exception, as was the case in the former use of '255.255.255.255' as the Default Subnet Mask, being the derived Subnet Mask for the Subnetting of the Parent Network's Hosts. Nevertheless, the Number of Host per Subnet are only approximations.

Nevertheless, since there exist a Total Count of 256 Decimal (Positive Integers), '0' not included, which are representations expressing the total Number of available IP Addresses. That is, since this is the inclusive count of the given Range 1 - 256. Where by, equation 1, which enumerates this inclusive count, yields the Total number of IP Addresses in the Range '1 û 256'.

1. 1 - 256 = 256, where '0' is excluded from the actual inclusive Total.

Moreover, this is also the Binary Representation, which equal of the inclusive count for the total addresses in the 1 - 256 Range. It can be concluded, that the Minuend 256, is some Multiple of the Number of Total Number of Hosts Bits. That is, given that calculation of this total, is also the inclusive count of the range comprising the Octets. In which case, the Binary Number of Hosts Available would be represented as 2^24, 2^16, and 2^8. That is, provided these numbers represent a count relative to the Total Number IP Bit Mapped Host Addresses. However, if the case is such that, the total number of Host Bit available were, '65,536', and the Least Significant Digit given as '128'. Then, the Total of IP Host Bit Addresses available given by the equation 2 would represent the used to determine the Number of Host resulting from the Subnetting of the Last 2 Octets in any given IP Address.

2. [65,536 / 128 = 512]

Furthermore, given the definition of Supernetting, as being the Subnetting of the Last Octet available in any IP Address. Then, the total number of IP Host Bit Addresses available would equal the Least Significant Digit. In which case, the results of equation 3 would translate to a total number of IP Host Bit Addresses equal to '1', which would have an IP Bit Map Address of 31 Binary Digits, as represented in Table 18 and the equation 3.

3. [256 / 128 = 2]

Nevertheless, the procedures involving Supernetting, as outlined in the Classless System, did not eliminate the Structure or concepts of the Class System. Especially since, it did not define Supernetting as a derivative of Subnetting, which is the Subnetting of the Last Octet of any IP Address. Notwithstanding, the Definitions and Laws defining the Internet Protocol Specifications for IPv7 and IPv8, which regarding their implementation, has change the concepts of Subnetting and Supernetting. That is to say, the definition of the Subnet Identifier imposes restrictions upon the availability of the Octets, which can be Subnetted or Supernetted. Where by, if only the Host Octets are available, then those that can be Subnetted is the lasts two Octets within the IP Address. While Supernetting, is now defined as the process of Subnetting the last Octet of an IP Address. In other words, the definitions and laws of IPv7 and IPv8 describe an outline for Supernetting and Subnetting, which can not violate the restrictions imposed.

Needless to say, except for the laws, definitions, and the resulting constraints imposed. The information provided herein, is essentially the same as that which governed IPv4. Nevertheless, the Tables below summarize the logical format, which outlines the results of the from the change in Binary Enumeration that defines the concepts of Subnetting and Supernetting in IPv7 and IPv8.

TABLE 16

```
       Decimal            Binary          Difference        LSD
    and Resulting         Results           Factor           ^
  Subnets / Supernets        ^           /    ^     \        |
       /   ^   \            /|\         /     |      \       |
      /    |    \          / ^ \       /      ^       \      ^
     /     |     \        /  |  \     /       |        \     |
    /      v      \      /   v   \   /        v         \   /v\
 1. 256 - 128  = 128  =   01111111,   256/128 - 128/128 = 1,   2^7
 2. 256 - 192  =  64  =   00111111,   256/64  - 192/64  = 1,   2^6
 3. 256 - 224  =  32  =   00011111,   256/32  - 224/32  = 1,   2^5
 4. 256 - 240  =  16  =   00001111,   256/16  - 240/16  = 1,   2^4
 5. 256 - 248  =   8  =   00000111,   256/8   - 248/8   = 1,   2^3
 6. 256 - 252  =   4  =   00000011,   256/4   - 252/4   = 1,   2^2
 7. 256 - 254  =   2  =   00000001,   256/2   - 254/2   = 1,   2^1
 8. 256 - 255  =   1  =   00000000,   256/1   - 255/1   = 1,   2^0
```

TABLE 17

Subnetting Results in IPv7 and IPv8

	Number Bit Hosts:		Binary Equivalent:	Equation to Determine Subnet Bit Mask	Available Hosts*
1.	8	=	2^3	(16 - 8 = 8) + 16 = 24	255
2.	9	=	2^3 + 2^0	(16 - 9 = 7) + 16 = 23	510
3.	10	=	2^3 + 2^1	(16 - 10 = 6) + 16 = 22	1020
4.	11	=	2^3 + 2^1 + 2^0	(16 - 11 = 5) + 16 = 21	2040
5.	12	=	2^3 + 2^2	(16 - 12 = 4) + 16 = 20	4080
6.	13	=	2^3 + 2^2 + 2^0	(16 - 13 = 3) + 16 = 19	8160
7.	14	=	2^3 + 2^2 + 2^1	(16 - 14 = 2) + 16 = 18	16,320
8.	15	=	2^3 + 2^2 + 2^1 + 2^0	(16 - 15 = 1) + 16 = 17	32,640
9.	16	=	2^4	(16 - 16 = 0) = 16 = 16	65,280

Note: The 'Asterisk' on the Available Host Column, is the Mathematical Calculation having the Results, which does not account the 'All '1's', or '0's' Exclusion Rule', and results in the Host count as being some multiple of '2^N'.

TABLE 18

Supernetting 'Last Octet' in Third IPv7 and IPv8

	Number: Bit Hosts:		Binary Equivalent:	Equation to Determine Subnet Bit Mask	Available Hosts*
1.	0	=	0^0	(8 - 0 = 8) + 24 = 32	0
2.	1	=	2^0	(8 - 1 = 7) + 24 = 31	2
3.	2	=	2^1	(8 - 2 = 6) + 24 = 30	4
4.	3	=	2^1 + 2^0	(8 - 3 = 5) + 24 = 29	8
5.	4	=	2^2	(8 - 4 = 4) + 24 = 28	16
6.	5	=	2^2 + 2^0	(8 - 5 = 3) + 24 = 27	32
7.	6	=	2^2 + 2^1	(8 - 6 = 2) + 24 = 26	64
8.	7	=	(2^2)+(2^1)+(2^0)	(8 - 7 = 1) + 24 = 25	128
9.	8	=	2^3	(8 - 8 = 0) + 24 = 24	256*

Note: The 'Asterisk' represents Values in which an account for the Rule excluding All Binary '1's', that can be maintained by a value of the 'Subnet Mask'. Here we have conclusions resulting in an exception, as was the case in the former use of '255.255.255.255' as the Default Subnet Mask, being the derived Subnet Mask for the Subnetting of the Parent Network's Hosts. Nevertheless, the Number of Host per Subnet are only approximations.

Needless to say, any analysis of figure 4, tables 7, 16, 17, and 18 (From Chapter V), would reveal that Subnetting or Supernetting concerns only the Values maintained in either the whole of One Octet, or some fraction thereof. In other words, while Table 17 and 18 shows the Subnet Bit Map Range exceeding more than One Octet. It should be clearly understood that some portion of this IP Address is the Network ID Portion. What this means, is that, the Decimal Value of the Subnet or Supernet ID IP Address can only consume either the whole or some fractional value of One Octet. Whose Range is derived from the 8 Bits one Octet contains (Table 16), while its respective Total Number of Hosts is a function of 2^N (Tables 17 and 18); where the value of 'N' is equal to the Number of Bits used to derive its ID IP Address. However, these calculations does not account accurately for the Host Count when assigning '256.256.256.256' or '11111111.11111111.11111111.11111111' as the IP Address for the Subnet or Supernet, which is an acceptable practice used to assign Hosts to the Parent Network IP Address.

Nevertheless, the values inherent and maintain by the implementation of the IPv7 and IPv8 IP Specification that underlie its logical structure, derives Routing Techniques, which yields a major performance gain over that provided in IPv6. Furthermore, while there is a difference from that described in IPv4. The inherent change is not so substantial, as to cause a serious burden and tremendous growth in the learning curve. However, because there yet remains strong similarities between IPv4 and IPv7. And since, IPv8 is an enhancement of IPv7. The discussion regarding Routing, shall focus upon IPv8, because its structure poses a challenge, which is a departure from that seen in IPv4. Nonetheless, the methods derived for Subnetting and Supernetting, above, should be understood as being applicable to both, IPv7 and IPv8.

However, even with this being said, IPv8 clearly show its kindred to IPv4, which is established through its relationship with IPv7. Hence, almost everything that was familiar in IPv4 is retained, and the provisions, which allows an 8 Bit growth rate approaching 128 Bit Addressing, yields a staggering '3.40282 x 10^38' IP Addresses. Moreover, Incremental Growth is a very significant factor, especially when considering the Routing and Networking implications. Where by, Supernetting and the techniques of CIDR attempts to improve Router performance through the use of the Subnet Mask, and by looking at the Back End of an IP Address Aggregation. Thus, allowing a reduction in the size of the Router's Table, and increasing the thoroughfare by permitting the assignment of several IP Addresses to this Back End Address.

However, the implementation of IPv8 suggests just the opposite, without the elimination of CIDR. Where by, Router's become more specialized Address Forwarding Computers belonging to 1 of 3 categories; The OuterCom, the BridgeCom, and The InterCom. These categories houses three router types in 2 Divisions; the 'Primary' and the 'Secondary'. Where the 'Primary' and 'Secondary' divisions provides the clarity, which indicates the established function and duties these Routers are to perform.

Nevertheless, the routers belonging to the 'OuterCom' category, is the 'Global' and the 'Internetwork' routers, which are assigned to the 'Primary' division. And while the 'Network' router does not have a divisional classification. It is assigned to the 'BridgeCom' category, because it serves both the 'OuterCom' and the 'InterCom' routers. Where it functions as a LINK, which is used to establish the communications between the 'Primary' and 'Secondary' divisional routers.

Nevertheless, this hierarchical structure concludes with the introduction of the 'InterCom' category, which houses the 'Secondary' divisional routers: the 'Inter-Domain' and the 'Intra-Domain'. These routers are used to control the internal communications of the Networks defined as being the smallest sections of this Network Hierarchical Architecture. Where by, the 'Inter-Domain' router routes, when the communication is 'InterCom', using only the IP Address of the Octets defined by the 'Subnet Identifier'. While the Intra-Domain router, routes an 'InterCom' packet to its final destination using the 'CIDR' technique.

The defining purpose of these classifications provides not only an accurate and functional description, but renders the Overview of the 'Network Architectural' Layout, itself, as a major boost in the overall performance of the Network. In fact, the implementation of this 'Network Architecture' alone, would reduce the Router's Table, reduce Network Traffic, and enhance System Management capabilities. Where by, the benefits inherent to these specialized Routers is accomplished by programming each to perform there individualized functions. While the Individualized Functions that the programming procedure would encompass, entails segmenting the IP Address into 'Routable Blocks' and creates 'Routable Blocks' portions of the 32 Bit Address Block, which would also be routable. This method would allow all of the OuterCom Routers to be programmed, for example, to Route only using the Front End of the 8 Bit Blocks of IP Address format. This is the convention and purpose for establishing the assignment, which defines the Global Router to the 'Zone IP' section of the IP Address, and the 'Internetwork' router to the 'IP Area Code' Address. Thus, achieving a significant increase in the Router performance overall, which is a far superior improvement over that which can be achieved using the CIDR technique alone.

The reality of these benefits becomes even clearer when an understanding of Front End Addressing achieved. Where by, the Global Router would route using only the first 8 Bits of an IP Address. The Zone IP, then remove the Zone IP Address before forwarding the communication to the Internetwork Router, which uses only the second 8 Bits to route by IP Area Code, and strips this 8 Bit Block IP Address before routing to the Network Router. This allows the Routers to determine if the communication is an Intercom or an Outercom, which is a method use to determine Geographical Location. In which case, if it is Outercom, the Router needs only to know the location, and or Hop Count, of the nearest Internetworking Router(IP Area Code Address), which in turn needs to know the location of the Global Router (Zone IP Address). The benefits here, is that, in either case, these Routers need only know, or be, 2 or 3 connecting Routes beyond the single Point of Failure.

Nevertheless, while all Intercom communications are Routed as belonging somewhere within the Domain of the Network Router, which also increases the overall performance in Routing Communication's. The Network Router is indeed the pivotal point of this Network Routing Hierarchical Structure. In other words, it is assigned the task required to establish the Inter and OuterCom Communications with the Global, the Internetwork, and the Inter-Domain Routers. This makes the Network Router the line of Debarkation, which is the necessary and fundamental focal point for all Communication Traffic.

However, the responsibilities this levies upon the Network Router and it's routing Table, remains yet, far less than the Corporations today. Where by, continuing with the '2 or 3 connecting Routes beyond the single point of failure' scenario, or CRBSPF. At most, the Network Router need only maintain 3 separate Routing Tables that contains the routes of the Global, the Internetwork, and Inter-Domain Routers. This provision provides the Network Router with the specificity that is necessary to improve Router performance, while allowing it to maintain individually, the respective knowledge of 2 or 3 connecting Routers and their Routes beyond the single Point of Failure.

Nevertheless, once the packet has reached the Inter-Domain Router of the Network, which lies outside the Boundary of any Private Network. In which there exist 4 types; Commercial, Governmental, Public, and Private. The Inter-Domain Router routes the communications packet, using only the first 16 Bits of the IP Address to route to the Intra-Domain Router of the packet's destination. This method provides the Inter-Domain Router with the same advantages of the 3 primary Router types. That is, it needs only to maintain the knowledge of the location of the Global, the Internetwork, the Network, and the Intra-Domain Routers, which comprise 4 separate Routing Tables. This knowledge also includes the location of 2 or 3 of these respective Router, and the associated connecting routes beyond the Single Point of Failure.

The above methodology, described clearly, the most basic routing hierarchical structure, and while this structure appears an oversimplification. However, there are only '255 Zone IP' Routers and '255 IP Area Code' Routers, which maintains contention for providing a performance increase, regardless. And while, these are the only Routers that can strip portions of the IP Address to improve the speed of transmission, which can be controlled in the Header, using Bits. Even routing the entire IP Address will not deplete performance, which is indeed, a boon for Security and Encryption Implementation, not to mention Secure Single Line Communication. And this is judged a real possibility, not only because of the increase in the transmission rates, but the likelihood of the number of people using this technique.

Furthermore, if the 3 Primary Routers maintained permanent locations, then clearly, this Routing Hierarchical Scheme would become a very plausible reality. This is because, not one of the Primary Routers would need to know the location of every Router, but if need be, could easily find them. Especially if, this system were further enhanced with Transmitters, which would Broadcast at regular intervals, or told by remote control, when to broadcast. This procedure would allow Routers, when needed, to use one of the Internet Discovery Protocols to find other Routers, or establish communications. Needless to say, the inherent advantages of this implementation are breathtaking, to say the very least.

I mean, when considering just some of the implications; Mapping, Tracking, Locating, and Navigation, which can all become possible through the use of permanently located routers. In what would become, a 'Land Based Global Navigation System', which uses ground based systems that communicates using the Hardware Address of MAC Layer. The startling features of this system, allows not only land, Air and Sea Navigation. But poses a serious challenge to the development and deployment of Communication Satellites, questions their high costs and significance. Especially since, this system could easily provide the Terrain Maps, Tracking and Locating persons or vehicles having the hardware to transmit a signal, and make real, the Reality of Un -Manned Transportation System. Even pilot Airplanes remotely, or provide a live monitor for every flight, as an added safety feature. And while 'LBGN', does poses a challenge to the current Satellite Communication Systems. It can not eliminate their use, because they provide an unquestionable visual observation ability, that a ground based system could never compete against, and would always maintain a disadvantage from the topological perspective.

However, the great advantage of this system, is that, it allows Emergency Response Personnel, to locate people in trouble, and do so, using the Hardware Address of the MAC Layer to find them, even while they are talking. And this implies, that the communication could be Cellular or Radio Wave. It really does not matter because, when Stationary Routers and MAC Layer communication is implemented, it could also be controlled, to prevent Traffic Congestion. Needless to say, while all of this might seem startling at first. The worry regarding a shortage of MAC Layer Addresses, is soon to become an issue. There's no cause for alarm however, because the badly needed MAC Addresses has already been created. Remember IPv6? It has all the MAC Addresses you will ever need, and then some to spare. Especially since, the possibility exist, that perhaps, some time in the future, or even now, the number of Hardware Devices will exceed the population total.

Needless to say, a Computer could easily handle the cumbersome structure and superfluous address definition. Which could be used to issue MAC Addresses to manufactures, or written directly to the Hardware Device. This would serve not only to reduce the errors, but save the people from the aggravation of having to use and work with the IPv6 protocol.

Nevertheless, while the limelight has indeed revealed the possibilities encompassing the 3 Primary Routers. It is clearly, the mandates commanded by the Secondary Routers, which dictates the change that makes these possibilities a Reality. However, given by today's performance standards, the Global and Internetwork Routers have the advantage of being capable of routing using only an 8 Bit IP Block Address, which is it also capable of stripping from the initial IP Address. Needless to say, while these issues might seem important by today's standards. There are similar advantages employed in the Secondary Routers.

Where by, the Network Router uses, at most, 16 Bits to route, and only 8 Bits are necessary for it to route to the Internetwork Router. This means that, the Network Router requires 16 Bits to route to the Global Router, and the first 16 Bits of the 32 Bit IP Block Address to route to the Inter -Domain Router. And while the Inter-Domain Router is the only Router that requires the use of the entire 32 Bit IP Block Address to route to the Intra-Domain Router. It routes to the OuterCom Routers using the methods they employ; the 8 Bit IP Block Address when routing to the respective Global and Internetwork Routers, and the first 16 Bit of the 32 Bit IP Block Address to route to the Network Router.

Nevertheless, the Intra-Domain Router uses at most, 16 Bits and CIDR techniques to route the communications packet to its final destination, and the same routing methods employed by the Global, the Internetwork, the Network, and the Inter-Domain Routers, to route to their locations. In other words, the Global Router uses only an 8 Bit IP Block Address for normal communication routing, and the entire IP Address for Direct Routing. While the Internetwork Router uses either an 8 Bit IP Block, the first 8 Bit of the 32 Bit IP Block to route. Where as the Network Router uses either 8, or 16 Bits to Route. However, the performance load seems displaced because, Inter-Domain uses either 8, 16, or 32 Bit IP Block Addresses to route, which means greater demand. And while the final destination should bare the brunt, the Intra-Domain Router uses only 8, or 16 Bits to route. And of course, as with the Global Router, the Intra-Domain Router must be capable of Direct Routing, which means, it must also route the entire IP Address as well.

Nevertheless, the results mandates an enhancement in the overall performance claimed by the Primary Routers, which are the requirements imposed by the Secondary Routers, that also necessitates the simplification of the existing wiring structure. These mandates are an extension of demands encompassing the established concepts of "Ease of Use and Implementation", and the 'Principle of Plug and Play'. In other words, this is a 'Start from the Ground Up' implementation. That requires the elimination of the present wiring system and "Junction Box". Where by, 'Bare Wires' would be replaced by either a 'Hub' or 'Connector Plugs', such as the 'Splitter' 'SJ45-2, -3, -4, and -6', which connects 2 or more distinct and separate 'Ethernet lines' in a network, and the 'SJ11-2, -3, -4, and -6', which is similar the Ethernet arrangement, but connects multiple and distinct telephone lines.

The obvious benefits notwithstanding, clearly, if IPv8 becomes the Standard for the Global Telecommunication System Interface. Then the existing Telephone Numbers in use today, would be replaced by the 32 Bit Block IP Address, and the Analog Telephones by Digital Telephones, which utilizes software to eliminate the need for anyone to maintain the obligation of having to remember any number beyond 15 digits.

In other words, the establishment of a sequential order having only an 8 Bit growth rate, is the ultimate boon for IPv8, which allows for a more gradual and stable growth approaching the 128 Bit IP Addressing format. Needless to say, its methods of Routing any form of Communication, clearly caps its superiority well beyond any other IP Specification. The evidence of this fact, is first established by its Front-End Routing techniques, and while communications from an Intra-Domain to some OuterCom Location would require the 48 Bit IP Address to remain intact. Its Front-End Routing techniques would prove still, far superior than the methodology in use today. Moreover, the second boon for Front-End Addressing, is derived from the 'Block-Addressing' Structure of the IP Address. While this structure allows only the Global and Internetwork Routers to Strip their respective IP Block Addresses from the IP Address when the routed communication is the direction of some Intra-Domain. The velocity at which these 8 Bit IP Address Blocks can be Routed in any thoroughfare will prove, just as fast, if not faster, than the Switches presently employed.

Chapter VI Conclusion: Outlining the Benefits of IPv7 and IPv8

The benefits from the implementation of IPv7 could be a reality now. This is because there are absolutely no changes in its Header, or any of the other specifications outlined in other RFC's pertaining to datagrams or its relation to other protocols. And while, the underlying representation for Enumeration remains the same, the process characterizing this method, the Binary Representation, has indeed changed. What this means is that, Software Upgrades required to implement IPv8, could be implemented now, to take advantage of every aspect of both IPv7 and IPv8. This is required because, regardless of whether or not IPv8 is used now, or 10 years from today, the loss suffered exceeds 133,000,000 IP Addresses available in IPv7, which is greater than IPv4. Needless to say, the validity of the latter, is established by the foundations presented, which underlie the logical foundations of IPv7 and IPv8.

Nevertheless, while the findings presented, are indeed confounding and thought provoking issues, which represent the beginnings of what could prove to become such a profound discovery. Whose impact could produce such a measurable, and significant effect upon every aspect of the Theoretical and Applied Mathematical Sciences. That every Industry caught in its wake, could undergo a profound and dramatic change. In fact, every Industry in every Technologically Advance Nation in the World, that succumb to the dependencies imposed by this Technological Revolution, called the Information Age, will indeed undergo such a profound and Revolutionary change, that no other event in all of History will seem its equal.

Notwithstanding the effects provided by the addition of a more stringent adherence to the rules of Logic. The stability of a more gradual and controllable growth in the number of available IP Addresses, will seem to most, beneficial. However, the effects of changing the method of enumeration in the Binary System, will boggle the minds of even the most knowledgeable, and educated of persons, the world over.

Clearly, the result of the implementation of IPv7 and IPv8 will usher more than a stable and gradual growth for the Global Telecommunications Community. In fact, the elimination of the mistakes in IPv4 and the change to the Binary System's method of enumeration, ushers new commitments and promises that will ignite the Dawn of the Intellectual Revolution. Needless to say, these promises are guarantees that will sustain not only the promises of 'Internet', but will establish the necessary foundation, which solidifies the gap that creates and maintains the cultural barriers and differences present in the world today.

Furthermore, the benefits from the implementation of IPv8 will seem to overshadow the number of available IP Addresses it provides. That is, its implementation will foster the reality of dreams that were once thought the fantasy found in the pages of a Science fiction novel. This includes such simple problems as those experienced by the Telephone Companies, the shortages in the supply of telephone numbers. Where by, the adoption of this system would change the count in the number of digits from the present 11, to a maximum of 15. Nonetheless, while this eliminates problems associated with growth and the constantly changing prefix. Its adoption could also change every concept in the Structure, Use, and underlying Foundations of the Entire Telecommunication Industry.

I mean, just think for a moment. Where, something as simple as the 'Junction Box' (MPOE), that now serves as the connecting and distribution point, for homes, business, and apartment complexes. It could quite conceivably, be replaced by a Network Server, a Router, and Hub, which would lessen the burden associated with the cost of the present arrangement. In short, the existing Private Telephone System would be replaced with a Private Computerized Telecommunication System, and the Public Telephone System would become the Computerized Information Telecommunication Systems. These new systems could service the population of the entire World with any information available from some assigned Resource Distribution Center.

While at the same time, IPv8 continues to open many other avenues of exploitation for the Industries of the Entire World. For example, the Television Industry, Cable Television Industry, the Video Telephoning and Video Teleconferencing Industry, are only a few of the many corporations that could benefit from its implementation. Nevertheless, accompanying this presentation, below, is a Table listing the Hardware and Software changes mandated by the implementation of the IPv7 and IPv8 IP Specifications.

Table of Changes and the Specifications
Required for Software and Hardware*

```
 HARDWARE IMPLEMENTATIONS | INDUSTRY EFFECTED | SOFTWARE & HARDWARE
     AND DEVELOPMENT      |                   | CHANGES AND SPECS
 -------------------------|-------------------|-----------------------
1: Digital Telephone /w   |Software           |Software Changes:
   Video Display and      |Manufactures,      |1. Network TCP/IP
   Optional Video Camera  |Telecommunications |   Configuration:
   "Mini-Operating System"|Equipment          |1a.Child Window to allow
   (Such as 'Windows CE') |Manufacturers,     |  Choice Options having
                          |Computer and       |  Selection between;
   Purpose: To Establish  |Related Equipment  |  a. IPv4 Address mode
   Telephone Communication|Manufactures, and  |  for "InterCom"
   Using the 'Internet',  |in all cases their |  Communications
   by Polling using MAC   |products effects   |
   Hardware Address for   |the Consumers.     |2a. IPv7 & IPv8 Address
 Status Check and Ringing.|                   | Mode for "InterCom" AND
  ------------------------|-------------------|"OuterCom" Communications
2: Design of SJ45 Splitter|                   | within the same
   to Connect Multiple    |                   | "IP Area Code", or
   RJ45 Lines; SJ11       |                   | outside of the Zone IP
   Splitter to connect    |                   | Address.
   Multiple RJ11 Lines    |                   |
   This would eliminate   |                   |Note: Child Window to
   individual wiring of   |                   |allow Choice Options
   Analog and, or Digital |                   |being either a 'Radial
   Telephone Connections  |                   |Button' and / or a
   and allow this scheme  |                   |"Question Message" asking
   to be replace by Hubs, |                   |if communications either
   Routers and Servers.   |                   |a InterCom or OuterCom
 -------------------------|                   |Transmission. Then,
3: Electronic Transponder |                   |asking for a Specific
  that Broadcasts IP      |                   |Location of Destination.
  Address Location to     |                   |(Locations are
  Determine Geographical  |                   |referenced from options
  relative to some known  |                   |
  or Fixed Location       |                   |Note: These changes
  (Query having Response) |                   |effect the Computer
                          |                   |Operating Systems and
                          |                   |other communications
                          |                   |software.
```

```
--------------------------|-------------------|
4: Design Of Language     | Applies to all    |
   Translation Servers    | the companies     |2. Application Changes:
  which will translate    |                   |1a. All Mathematical
  communications between  |                   |   software applications
  different cultures      |                   |and calculation programs.
                          |                   |Note: Changes effecting
                          |                   |    Application Software
--------------------------|                   |    performing some
5: Global Accessed        |                   |    function related
  Resource Information    |                   |    to/in Mathematics,
    Servers               |                   |    results from the
                          |                   |    Change in the Methods
                          |                   |    of Enumeration in the
--------------------------|                   |    "Binary System".
6: Design of Super        |                   |
  Computer Controllers    |                   |3. Network Operating
  to control Routing and  |                   |   System
  the Switching functions |                   | 1a."IOS" Internet or
  to replace current      |                   |    'Network Component
  Telephone Systems       |                   |     Operating System'
                          |                   |
                          |                   | 2b. BIOS of Networking
--------------------------|                   |Components and Equipment
7: Automobile equipped    |                   |
 with Computer IP         |                   |Note: The changes
 Broadcast Transponder,   |                   |effecting Network OS
 Locator                  |                   |and BIOS of the
                          |                   |Connecting Components/
--------------------------|                   |Equipment which Connects
8: Medical Patients       |                   |Computers in a Network
   wearing Computerized   |                   |must allow for the
   Status Devices linked  |                   |changes outlined in
  Medical Response Teams  |                   |Appendix III, as given
  using IP Broadcast      |                   |by the definitions.
  Devices                 |                   |
                          |                   |4. Electronic
--------------------------|                   |   Sub-Component
9: Computerized Homes and |                   |1a. "Gate Logic"
   Appliances using IEEE  |                   | "Binary Instruction"
   1394 FOR connection and|                   |  Set" for 'CPU' & 'IC'
  IP Broadcast for Alarms |                   |    Components.
  and emergencies.        |                   |
```

```
                          |                   |This would be viewed
--------------------------|                   |as a reduction in the
10: OuterCom and IntraCom |                   |Number of 'Logic Gates'
   Routers with Port      |                   |required for a given
   Assignment Control and |                   |circuit, which are the
   allow Host connection /|                   |results from the

  Direct connection to    |                   |Analysis of the
  OuterCom communications |                   |Conclusions yielding a
  to reduce Multiple IP   |                   |New Method of
  Address to same Location|                   |Enumeration for the
  (But there is plenty    |                   |'Binary System'.
   to be assigned)        |                   |
--------------------------|                   |5. 'Discovery and
11: Change in the Binary  |                   | Activation Protocol
    Logic that Outlines   |                   | Algorithm Design'
    not only the Functions|                   |1a. Remote Location and
    of the Central        |                   | Control of hardware
    Processing Unit, 'CPU'|                   | Devices.
    but provides it the   |                   |
    ability to distinguish|                   |2b. Algorithm Design
    the Operating System  |                   | For the Method of
    it uses. In other     |                   | 'Triangulation' of
    words, every 'CPU' can|                   | Land Based Global
    now become a 'Hybrid',|                   | Positioning Systems
    which can use any or  |                   | which communicates with
    every Operating System|                   | MAC Address of Hardware
    available in the      |                   |
    Computer Industry.    |                   |
    And this also provide |                   |
   the 'CPU' and its usual|                   |
   Operating System with  |                   |
   the ability to share   |                   |
  programs or applications|                   |
  other Operating Systems.|                   |
```

12:Transponders, Receivers and MircoWave Transmitters placed in the Standing Lights on Roadways and in Cities for the implementation of # 3, 7, and 8 noted above. Which could be made to Pilot and Navigate Driverless Vehicles and Trains, which Maps Terrain of the Roadways, which control the Guidance Transmitters implanted in the Reflectors of the Roads Lane Dividers / or Below.	Wireless Technology and the companies Listed in # 1 above	The implementation and Design of Electronic Components which allow MicroWave Transmission Between Dishes on top of Standing Lights and Buildings or any Towering Structure, manmade or Natural Which would offset the need for Satellites as the primary Communication medium which maintains equal Bandwidth / Thoroughfare Which can be implemented without environmental disruption. Noting the Frequencies which would be less harmful. In which case, this System would serve for Fiber Wire, or use Wireless if Fiber is not possible.

Security: The Relationship between IPv7 & IPv4, and the Security; Suggested and Recommended Alternatives for IPv8

There are no differences between the security methodologies employed in IPv4 and that of IPv7. In fact, IPv7 is nothing more than an IP Addressing Scheme Overlay that exploits the format of the IP Address Scheme used in IPv4. Nevertheless, while there is an existing difference between these Addressing Systems, they pertain only to the mathematical operations involving the calculation of their respective IP Addresses, which are now governed by a Set of Logical Laws. Furthermore, when noting their version numbers, since IPv7 is not an assigned version number and identical to IPv4. It is not necessary to change from the present use of IPv4. In other words, IPv7 is IPv4 having a different IP Addressing Schematic depicting the number of available IP Addresses for distribution. That is to say, it does not require even a version number change for compatibility, IPv7 is IPv4. This also means that the rigorous testing required of a New IP Addressing System can be eliminated.

Nevertheless, while IPv8 is an enhancement derived from IPv7, it does maintain marked differences, as seen in the IP Addressing System employed. However, this should not pose any challenges for the IP Community to examine or test. But, this is not to say, that its implementation of Security measures will not be different from that now used in IPv4. What I am saying, is that, IPv8 will prove far less cumbersome than IPv6. This fact will become even more pronounced when it is realized that the consideration for any determination regarding the level of difficulty in the implementation of a Security System, is indeed dependent upon the IP Addressing methods of enumeration.

Moreover, it should be clear that another distinction maintained by IPv8, which is a provision that allows for a separation or division of the Security measures employed. This is a result of the 'Address Block' configuration, which provides a way to Address, Separate and Distinguish the Different Segments of the 48 Bit IP Address in IPv8. However, the result of this method allows for the creation of 3 levels of Security, because there are 3 separate and distinct IP Addresses that equal the total of this 48 Bit configuration; YYY:JJJ:XXX.XXX.XXX.XXX or 256:256:256.XXX.XXX.XXX).

This however, emphasizes a greater the need for Security measures, which should be employed to control InterCom and OuterCom communications of the Global Internetwork. This reality is evinced by the fact that, the Global Telecommunications Community for the first time, will assume its true identity. Where by, because of the need for an ISP to establish the connection to the Internet. We become impressed with the thoughts of the Global Telecommunications Community (The Internet) as being a Dynamic

Communications System. That's always on, and never sleeps. However, this is a miss conception, or interpretation of that which is truly as Static System.

That is to say, the Global Telecommunications Community (The Internet) is only a thoroughfare, which is not unlike the cable connecting the telephones presently in use. In other words, to have a single connection requires a Link. It does not matter, if this Link or connection you dialed, provides you with a Requester or an IP Address. The point to be made, is that, a connection must be established with someone, who will grant access to his or their location on the Party Line. What this means, is that, the Internet is only a Cable. While the Global Telecommunication's Community, is indeed a Community, which consists of several Millions of People who have jointly agreed to become members of this Party Line. Thus, allowing access to their Telecommunications Information System, to anyone whom has agreed to become a member.

Nevertheless, IPv8 transcends this present and limited notion of the Internet, and truly provides everyone with access to the Global Telecommunications Community. Where by, everyone in the world having a telephone today, would have controllable access to this Party Line. However, everyone connected to the Global Telecommunications Community would use the IPv8 Addressing Configuration related to the connection of the Destination Address with whom they chose to communicate. In other words, if the Destination was located within the Zone and IP Area Code of the Source, then they would only need to use the 32 Bit portion of the 48 Bit IP Address. This is because the Router used to Transmit the communication would be a InterCom Router, capable of routing the IP Area Code Address Block and the 32 Bit IP Address indicating the Network IP Address of both the Source and Destination locations.

Needless to say, this diverse functionality provides a greater expansion of the IPv7 IP Addressing System without any sacrifice in the over all Security, as would be the case if a significant departure from the IP Addressing System now employed, were implemented. In fact, the knowledge gained through the implementation of the Security measures in IPv4, should provide a strong foundation for any transition to IPv8.

What this means, is that, the degree and type of Security can vary as a matter of choice or concern. For example, an Administrator could use the same level of Security for IntraDomain Communication (InterCom) and either increase or use a different, more specialized type of Security measure for the OuterDomain Communication (OuterCom).

In other words, one suggestion that would create this possibility, is to employ a software tool that would allow the user to differentiate the locations they desire to establish a communication with, which is prefixed by either or both, the Zone IP or IP Area Code. The software would then, automatically configure the corresponding IP Addresses within the datagram, which is identical to the current methods in use. This would allow all communication that exists within the same Zone IP and IP Area Code Address to be the same as that which is presently employed. The reality of this process is derived directly from the concept of the Smart Router. Whose programmed task, when routing any transmissions, is that of Striping either the ZONE IP, the IP Area Code, and no part of the sequence of the Network IP Address, which is related to its location for delivery of the transmission to its destination.

Nevertheless, this method reduces somewhat, the complexities of implementing Security measures for a 48 Bit System to that of a 32 Bit System, which would resemble IPv4 and IPv7. Whose Security can be controlled by the same methodology, that being, Software Encryption and Access Rights, which is now employed. What this suggests, is that, IPv8 can have 3 distinct levels of Security, which can be implemented automatically by the Routers, and, or controlled by Software.

What this implies, is that, every Domain must have a minimum of 2 types of Routers to control IP routing and Security; the IntraDomain Router (InterCom Router), the Inter-Domain, the Network, the Internetworking Router (OuterCom Router), and the Global Telecommunications Router (Global Router). Their functional purpose would not only facilitate Routing, but enhance Security Communications as well. This is because the methods of Routing employed would consist of the Front End of the IP Address, and Encryption of the Data Segment of the transmitted Packet. Where by, each type of Routers need only know the location of the next Router which routes the either the same IP Address Block or the next IP Address Block in the sequence. This would essentially have the effect of creating a One-Route Path having a Multi-IP-Address-Thoroughfare. That would allow Decryption of Datagrams either by specific Routers, or the Software of the intended Destination.

Needless to say, this suggestion does not necessarily impose a challenge upon the Firewall. Where by, Security could be a combination of both, or just controlled by the Smart Router, and access to the InterCom from a Hacker transmitting from some location on the OuterCom would be, for them, the Fort Knox Challenge.

In other words, the Router could be used for Decryption and Encryption of the communications it receive and transmits, or Encryption can be performed by the Router and Decryption could be performed by Software. Whose decryption key code is transmitted, embedded in the Datagram. There by, allowing the receiving destination's previous decryption code, to decrypt the Key Code to be used to determine the decryption sequence of the current transmission. The Cable Pay Television Industry could implement such a process. In which the Encryption, Decryption Software would be supplied by them to their customer. While the Global Router could control and be programmed for random sequencing of the Encryption, and corresponding Decryption Key to be sent with the transmission. Or, by using Direct Communication, Encryption and Decryption could be accomplished from the PC of the intended destination.

However, the latter could be the likely scenario used in a High Security Area, such as the Military or some Top Secret Research Facility. Which would have the need to maintain strict control of the InterCom and OuterCom Transmissions. In other words, a Smart Router would be capable of discerning the type of Traffic it is passing. That is, the difference between a transmission that is Encrypted, not Encrypted, and that which has the incorrect encryption. And then perform the necessary functions of Decryption on one transmission, while being capable of sending both transmissions to their destinations.

This would provide a common access control for Authentication and Synchronization of the Encryption and Decryption Keys. Thus, providing the necessary Security to control the Inter and Outer æCommÆ communications within the same Zone and IP Area Code. Which would in essence, provide places needing to regulate access to the Global Community or their InterCom, with the Security control they need to regulate the traffic entering or exiting their Domain. In other words, it is suggested that, IPv8 IP Addressing System should be implemented with 3 levels of Security, comprising 48, 40, and the 32 Bit IP Address possibilities it contains. These benefits however, might possess an additional cost, which the long run would prove it worthy.

Nevertheless, it can be concluded that the benefits offered by the implementation of IPv8 within the same 'Zone IP Block Address' and 'IP Area Code', changes none of the Security procedures, which are now present in the use of IPv4 today. However, it is a Recommendation, since Global Telecommunications does require the use of the ZONE IP and IP AREA CODE BLOCK Addresses, that another 'DHCP*' be specified for use in conjunction with the Global Router. This implementation is seen necessary not only for the 48 Bit IP Address and Network Name Resolution, but also because of the Additional Security Requirement that is fostered by the implementation of this IP Addressing System.

*Note: While inclusion of more that One DHCP Server, or Multiple DNS Servers does maintain the advantage that would facilitate Address Assignment and Address Name Resolution in the complex Addressing environment of IPv8, or the Internet for that matter. It will not however, supplant the requirement nor the need of having to Re-Write (i.e. Patch) the Software for each of the Respective Servers. Noting that, using only one of these respective Severs may meet the requirements of any Network. However, there can be 2 or more of each, but at least one must exist, of each of the respective Servers used, whose Software is written for compliance with the IPv7 and IPv8 IP Specifications, which would establish or Link Communication beyond the Domain of the Intra-Network or Private Network Domain.

Needless to say, this would provide the necessary Security benefits of having controlled access to the Global information in other Zones and or IP Area Codes, which would allow the continued use and enjoyment of the uniform security standard presently used in the 32 Bit IP Addressing System today. Nevertheless, these Enhanced Security Control Features should be viewed as a Boon, because they provide a much greater scrutiny and control over Inter and Outer Comm Communications for every Network Connected to the Global Telecommunications Community. However, this implementation is only possible through the use of the 'Smart Router' and the services provided from a second 'DHCP' Server. Which together, would provide the necessary functions and ability to make these enhanced security features possible. In other words, the recommendation is that, there should exist 2 'DHCP' Servers, one for connection to the Global Community and the other for Communications within the same 'Zone IP Address' and 'IP Area Code'.

Nevertheless, these are for the most part suggestions, which can be considered as recommendations, and Standard implementations. The point made however, is that, with IPv8, any Security Implementation can be Built upon the foundation and knowledge gained from that existing in IPv4. This is to say, IPv8 can be used, or implemented, without extensive testing. Because it is a logical derivative of IPv7, which maintains same similarities that IPv7 has with IPv4. And while there exist hardware configurations that can remain in use. There exist other hardware concerns, which remain in question.

Be that as it may be! Whatever the selection is chosen from the multitude of possibilities, as the best possible representation for the 'HEADER' used in IPv8. It should be clearly understood, its choice is arbitrary, which does not necessarily degrade, nor improve the efficiency or use of IPv8. Needless to say, for every RFC written which entertains issues concerning Security. The implementation of IPv8 that would become effected, or seen as a change from IPv4, concerns only the Zone IP and IP Area Code Block Addresses, which should not require any appreciable change either beyond IPv4 or that which has been recommended. In other words, for the most part, IPv8 is a supple change, which underlies a major Structural Departure from that of IPv4. Which means that the Security methods implemented in the latter, will retain a measurable degree of validity, use, and application, in the former.

Nevertheless, every individual can have their personal IP Address, just like the Phone Number exists today. Which does not exclude the existence of the Disconnected Private Network Domain. Needless to say, the only limitation for Implementation of Security Measures, is the imagination of the Hardware and Software Designers.

Note: It is important to mention that the IP Addressing Format of IPv8, has an inherent Security Feature, which if used, would require an Independent Login / Password / Authentication at the Zone IP Address, the IP Area Code Address, and the 32 Bit Block Network Address. And this could also include the more advanced encryption methods, beyond the standard now employed for Authentication. This is analogous to perhaps, a Security Level of C-5, or maybe higher (A-2), because other options can be employed, and a greater control for Security exists.

Appendix I: 'Graphical Schematic of the IP Slide Ruler'

```
======================================================================
= Octets     2nd   3rd   4th                 Figure 1
=  1st        |     |  .......

=   |         |     |  .     .
= -----       v     |  . 001 .  The IP Addressing Slide Ruler clearly
=   ^      .......  |  .......  establishes the Differences between
=   |      . **  .  |  .     .  Decimal and Binary Calculations.
=   |      . 001 .  v  . 160 .  Where, in this case, the Number of
=   |      ...................  Rulers or Slides, represents the
=   |      ...................  Maximum number of Hosts available in
=   |      .     .     .     .  an IP Address Range having an
=          . 160 . 001 . 188 .  Exponential Power of 3. That is, if
=  IP      ...................  the First Octet is Defined by the
= Address  ...................  "Subnet Identifier", as providing
=  Range   .     .     .     .  a Network within the IP Address
=          . 188 . 160 . 223 .  Range assigned to this Class. That is,
= 1 - 255  ...................  the individual Ruler or Slide, has a
=   |      ...................  one-to-one correspondence with the
=   |      .     .     .     .  OCTET it represents, and is equal to
=   |      . 223 . 188 . 239 .  an Exponential Power of 1. Which also
=   |      ...................  maintains this one-to-one
=   |      ...................  relationship. In any case, it should
=   |      .     .     .     .  be understood that the Decimal is an
=   |      . 239 . 223 . 256 .  Integer representing the IP Address,
=   |      ...................  and has only 1 value that occupies
=   |      ...................  the given Octet. However, the Binary
=   |      .     .     .        representation for the IP Address, is
=   |      . 256 . 239 .        an 8 digit Logical Expression
=   v      .............        occupying one Octet. Where each digit
= -----          .......        has a 2-state representation of either
=                .     .        a 1 or a 0. The distinction is that,
=                . 256 .        this is a Logical expression that has
=                .......        no Equivalence. However, there is a
=                               Mathematical Method which resolves
=The ( ** ) indicates           this distinction, and allows for the
=the Reference point            Translation of each into the other.
=of the IP Side Ruler.          In other words, one System can never
=                               be used to interpret any given value
=                               of the other, at least, not without
=                               the Mathematical Method used for
=                               Translation. But each, can separately
=                               be mapped to the structure of the 'IP
=                               Slide Ruler ', rendering a translation
```

=   for one of the two representations.
=   (Noting that the Binary Translation of
=   its Decimal equivalent must be known
=   first.)

Note:[An example of the assignment of a 'ZONE' Number Prefix in IPv8 would be that of a Continent; North America or South America. While the example of the location for an assigned 'IP AREA CODE' in IPv8 would be some Sub-Region within a 'ZONE Prefix' (Continent): New York or Chicago. The convenience of this structure, is that, the Zone Prefix assigns an entire IP Addressing Scheme to that Area (256 Locations), and the IP AREA CODE allows for a further expansion or division of each IP Address Class (256 Sub-locations) within the Addressing Scheme. However, the assigned Zones and IP Area Codes are not Variables, which means they are permanently assigned to the IP Addressing Scheme. But the IP Addresses they prefix are variables, which can be changed. Nevertheless, the IP Slide Ruler is used only for IP Addressing, and not the Prefixes.]

Appendix II: The Beginnings of the Discovery; Mathematical Anomaly

My work in the Mathematical Field of Number Theory, provided me with an unprecedented insight of the underlying logical foundation existing in the whole of mathematics today. Needless to say, the discovery, which sparked another Revolutionary Change in the Mathematical Field, was once again, a violation of some elementary concept.

Nevertheless, the mathematical issue that resulted in a change in the methods of enumeration for the Binary System, started as an argument concerning the existence of the 'One-to-One' Correspondence between the Mathematical Calculations involving the Decimals (Positive Integers) and those concerning the Binary Operators (Logical Expressions; the Truth Table values of 1's and 0's). Needless to say, it is worth presenting once again, the Analysis of this Mathematical Anomaly, which caused this Mathematical Upheaval.

Please note the ongoing argument, which attempts a resolution of This Mathematical discrepancy. Where by, given Class B as the starting point, we have:

1. Class B; 128 -191, IP Address Range
   Default Subnet Mask; 255.255.000.000
   (Which yields: 2^14 Networks and 2^16 Hosts;
   that is, 16,384 Networks and 65,536 Hosts.)

However, this total is not the correct method of enumeration, and it is not the actual number (Integer Number) of available networks. And this FACT becomes even more apparent when the Binary Translation of the Decimal (Positive Integers) Numbers is completed. That is, the result would yield 64 Binary Numerical Representations, ONE for each of the Decimal numbers (Positive Integers) that are available in the IP Address for the Class B.

Where Class B should maintain the representation (Which provides the actual Integer enumeration for the calculation of the total IP Addresses available. In other words, their independent count, of their respective totals for the Actual Number of Available IP Addresses in the Class B should Equal '64'.) given by:

```
2. Class B: 128 -191, (Which equal the total of 64
   possible IP Addresses for the given Address Range)
   Default Subnet Mask: 255.255.000.000
   (Which results in 64^2 Networks and 254^2 Hosts;
   that is, 4,096 Networks and 64,516 Hosts.)
```

Nevertheless, an enumeration, or break down count association, of each representation, that is, Binary and Decimal. Would indeed, provide a greater support for the conclusion presented thus far. Where by, given the Classes noted in 1 & 2 above. We have:

```
1a. (128 + 128 + 128 + 128 + ...+ 128) = 128 x 128 = 2^14
        1     2     3     4   ...  128 = Total Count
```

Which equal the Total number of Networks for the Given Address Range.

And

```
1b. (255 + 255 + 255 + 255 +...+ 255) = 255 x 255 = 2^16
        1     2     3     4  ...  255 = Total Count
```

Which equals the Total Number of Hosts for the Given Address Range.

While noting that these equations represent the Binary Method for determining the number of Networks and Hosts for the given Address Range of Class B. However, keeping this in mind, notice the difference that exist when this same calculation is used for the Decimal (Positive Integer) representation.

```
2a. (64 + 64 + 64 + 64 +...+ 64) = 64 x 64 = 64^2
       1    2    3    4  ...  64 = Total Count
```

This remains true regardless, that is, even if an argument regarding the possible existence of a different value of the variable in the Second Octet, which would account for the inclusive total of the range 0 - 254. The error would exist still, because of the standing Rule, which does not allow the Host or Network IP Address to maintain a value representing 'All Binary '1's' or All Binary '0's'. In which case, the result of 2a, as noted above, would be given as, 64 x 255 = 16,320. Needless to say, the count given as the Binary representation of the total number of Hosts and Networks IP Addresses for the IPv4 System, as concluded above, is still wrong!

Where this number equals the number of Networks for the Given Address Range assigned to Class B.

And

```
2b. (254 + 254 + 254 + 254 +...+ 254) = 254 x 254 = 254^2
        1     2     3     4  ...  254 = Total Count
```

Where this equation represent the Total Number of Hosts for the Given Address Range of Class B.

In other words, given the equation (191 -128) + 1 = 64. We are then presented with the Total Number of Addresses available for the given Address Range, 128 - 191, for the Class B. Where it can be seen that, any One-to-One mapping of the Numbers in the Address Range and the Counting Numbers (Positive Integers), beginning with 1. Should yield the Total Number of Addresses available in any Count, for the Determination of the Total Number of Networks. And this same line of reasoning applies to the Host count, as well.

> ['Where the Subscript Number equals the Value of the Total Number of Available IP Addresses (a One-to-One Correspondence between the Enumeration of, and the Address Ranges given) for the Network and Host Ranges in Class B. Where both Binary and Decimal Number representations are the given examples.']

Nevertheless, when the Decimal and Binary conversion is completed. That is, when you establish a One-to-One relationship between the Binary and Decimal Numbers. You would discover that the their respective totals would be the same. That is, there can only be 64 Binary numbers and 64 Decimal numbers for the calculation of the Total Number of Networks. And there can only be 254 Binary Numbers and 254 Decimal Numbers for the calculation of the Total Number of Hosts. The difference is that, the former method reveals the Binary calculation, while the latter is the Integer (called the Decimal) Calculation. Needless to say, it should be very clear that the Binary method is a Logical Expression, and does see the Integer Count, that is the 'Difference between the Range Boundaries Plus 1'. Which yields the total number of available IP Addresses to be used to determine the actual number of Hosts within a given IP Address Class Range. Clearly, the Decimal method is indeed a Mathematical Expression representing the operations involving the Positive Integers.

Appendix III: The Reality of IPv6 vs. IPv8

Introduction

Any deliberation upon the foundational differences existing between any two or more systems, is a daunting task, whose resulting dissertation would require years just to complete a single reading. However, if such a study first, begun by eliminating those portions of each system, which maintained a universal application to every system in which such a study would comprise. Then, the amount of time would be significantly reduced, because the subject matter would only entail the analysis of those parts pertaining to the differences each systems maintained relative to the other. Nevertheless, it should be clear, that the outline of this Appendix will only present a succinct view of this endless count, of what will be concluded as the beneficial differences maintained by IPv8 when compared to IPv6. Which will nonetheless, be shown far to be far superior to any offering rendered by the implementation of IPv6.

In other words, the reality regarding the benefits or short comings of any IP Addressing System, which is not a direct reference to the Mathematical Methodologies entailing the Address themselves, are indeed the universal and superficial extensions, which are not relative to any particular system. Where by, issues such as the Header Structure, Functional Definitions describing Address Classes, and other Operational Methods, which are associated with the Addresses, are all Universal Extensions of the Addressing System that maintains a universal application. Which can be employed for use in any IP System of Addressing. Needless to say, these are inherent facts regarding the discussion of any IP System of Addressing, which necessitate an understanding of the over all implications relating thereto. Where by, after the elimination and resolution of all matters concerning the Universal Extensions, because they maintain or can become a usage, function, or implementation shared by both systems. The focus of attention regarding any implementation of a Global Telecommunications Standard, would now center entirely upon the mathematical enumeration methods of, and the IP Addressing System Schematic itself.

Nevertheless, Hinden's work, "IP Next Generation Overview", made reference to several possible uses for the IPv6 protocol. In fact, he tended to ignore other specification, which would probably prove more suitable when configuring Household Appliances; for example IEEE 1394. Needless to say, while it is clear that his objective was to exemplify the possible uses and applications of IPv6. He did in fact ignore, the amount of Network traffic, or Bottlenecks, the inclusion of devices such as these would create. Moreover, while household appliances would probably be connected to a Computer System, which is Networked to the Global Telecommunications Community. It will be the controlling application, which would be accessed from some remote location and not the device itself. Needless to say, he emphasized moreover, that the number of available IP Addresses in the present IPv4 System and Routing, were the underpinning issues, which promoted the need for another IP Addressing System.

Nevertheless, the only issues regarding IPv6 and IPv8, which shall embody the topics of this Appendix are, Structure of the IP Address, Routing, and their related issues.

The IP Addresses of IPv6 and IPv8 Compared

First and foremost, it should be noted that, IPv6 is not a Global Telecommunication Standard, because it does not offer nor include, any incorporation of the existing Telephone Communication System. However, while it does expand the number of available IP Addresses to the Global Internet Community. Its Default Addressing Structure however, is redundant, and the definitions incorporated in this IP Addressing System, outlining its underlying purpose / structure / use, lack the soundness of logical support, which are indeed superfluous. In other words, the IPv6 IP Specification, itself, lacks the logic foundation of Sound Mathematical Reasoning, which would justify its Existence, and its total IP Address availability is less than IPv8.

Where by, IPv6 offers a pure 128 Bit IP Addressing System, and a Backwards compatibility comprising 96 Bits of IPv6 Address and 32 Bits of IPv4 Address. This yields, to say the very least, an unprecedented number of available IP Addresses, with no mention of the possibility of individual IP Address assignment for the general public, which comprises the total population of the world. However, it does provide IP Addresses for business uses, which can then make assignments for use by the general public. Nevertheless, as a point of interest, a 128 Bit IP Address Scheme is equated to '3.40 x 10^38'. Which is, given the total population of the world as being '6.0 x 10^9', is approximately equal to assigning 3.64 x 10^28 IP Addresses to each and every individual person on the planet.

Nonetheless, one would assume that the purpose for a Global Telecommunication System, was not only the concerns for free enterprise and the ever growing number of people wanting the availability of a much broader means of communication. But to address the needs of the public at large, which the emergence of the 21st Century now mandates.

Needless to say, the overall structure of IPv6, bars the assignment of individual IP Addresses. Where by, given that an individual location represents a single NODE Connection. IPv6 almost commands that every Node maintains several INTERFACES, which would allow the assignment of several IP Address Numbers, one per Interface, to establish connections for the services offered by different providers. This scheme almost certainly guarantees, that the present cabling system will become an over burden Network Highway of continuous Traffic Jams and Bottlenecks. This moreover, does not even raise a Brow regarding the Backseat, that "The Nightmare on Elm Street" must take, when the IT Professionals must consider the Management of such a Network. Just forget about troubleshooting, component failure, or some unforeseen catastrophe!

I mean, consider for a moment the layout of the defined Sub-Divisions, nested might I add, which is the purported Hallmark of the IPv6 Addressing Scheme. And which, is not employed by IPv8, because it is designed to maintain a similar functionally as that of the present Telephone System. All while retaining the ease of use and implementation corresponding to IPv4.

1. **UNICAST ADDRESS; The One-to-One method of communication, which exist between 2 Nodes.**

   a. Global Based Provider; Provider based unicast addresses are used for global communication.
   b. NSAP Address
   c. IPX Hierarchical Address
   d. Site-Local-Use; single site use.
   e. Link-Local-Use; single link
   f. IPv4-Capable Host; "IPv4-compatible IPv6 address"
   g. With IP Addresses Reserved for Future Expansion

2. **Anycast Addresses; an address that is assigned to more than one interfaces (typically belonging to** different nodes), with the property that a packet sent to an anycast address is routed to the "nearest" interface having that address, according to the routing protocols' measure of distance.

3. **Multicast Addresses; a multicast address is an identifier for a group of interfaces. A interface** may belong to any number of multicast groups.

TABLE AI

Allocation	Prefix(binary)	Fraction of Address Space
Reserved	0000 0000	1/256
Unassigned	0000 0001	1/256
Reserved for NSAP Allocation	0000 001	1/128
Reserved for IPX Allocation	0000 010	1/128
Unassigned	0000 011	1/128
Unassigned	0000 1	1/32
Unassigned	0001	1/16
Unassigned	001	1/8
Provider-Based Unicast Address	010	1/8
Unassigned	011	1/8
Reserved for Neutral-Interconnect-Based Unicast Addresses	100	1/8
Unassigned	101	1/8
Unassigned	110	1/8
Unassigned	1110	1/16
Unassigned	1111 0	1/32
Unassigned	1111 10	1/64
Unassigned	1111 110	1/128
Unassigned	1111 1110 0	1/512
Link Local Use Addresses	1111 1110 10	1/1024
Site Local Use Addresses	1111 1110 11	1/1024
Multicast Addresses	1111 1111	1/256

TABLE AII

SCHEMATIC DESIGN OF THE IPv6 IP ADDRESS

1. Provider Based Unicast Addresses

```
| 3 |  n bits    |  m bits    |   o bits     | p bits  | o-p bits |
+---+-----------+-----------+-------------+---------+----------+
|010|REGISTRY ID|PROVIDER ID|SUBSCRIBER ID|SUBNET ID| INTF. ID |
+---+-----------+-----------+-------------+---------+----------+
```

2. Local-Use Addresses

Link-Local-Use

```
|   10     |
|  bits    |        n bits           |       118-n bits           |
+----------+-------------------------+----------------------------+
|1111111010|           0             |       INTERFACE ID         |
+----------+-------------------------+----------------------------+
```

Site-Local-Use

```
|   10     |
|  bits    | n bits  |    m bits     |       118-n-m bits         |
+----------+---------+---------------+----------------------------+
|1111111011|    0    |   SUBNET ID   |       INTERFACE ID         |
+----------+---------+---------------+----------------------------+
```

3. IPv6 Addresses with Embedded IPV4 Addresses

"IPv4-compatible IPv6 address"

```
|                80 bits               | 16 |      32 bits        |
+--------------------------------------+--------------------------+
|0000..............................0000|0000|    IPV4 ADDRESS     |
+--------------------------------------+----+---------------------+
```

"IPv4-mapped IPv6 address"

```
|                80 bits               | 16 |      32 bits        |
+--------------------------------------+--------------------------+
|0000..............................0000|FFFF|    IPV4 ADDRESS     |
+--------------------------------------+----+---------------------+
```

4. Multicast Addresses

```
|   8    |  4 |  4 |                 112 bits                      |
+------- -+----+----+---------------------------------------------+
|11111111|FLGS|SCOP|                 GROUP ID                      |
+--------+----+----+----------------------------------------------+
```

We need not concern ourselves with Table AI, because its definitions are arbitrary, and can be applied to any 128 Bit IP Addressing Scheme. However, Table AII provides the reality, which relates the meaning of the MANY SKELETAL (Default) STRUCTURES an IP Address can have in IPv6. While the Default Skeletal Structure of an IP Address in IPv8 has only One Simple Format, which is used throughout its Addressing Scheme. Needless to say, these IP Address structures in IPv6, form the bases of the foundation for another, yet undefined Class System. Which uses WORDS to define different segments of the Skeletal (Default) IP Address, for which the numbering system of the IP Specification must correlate. Furthermore, they exhibit and maintain a repetitive definition having the same overall purpose, which was achieved using the simpler methods in IPv4. To say the very least, this is a more complex structure, differing markedly from IPv4, and the Skeletal IP Address defined by the Default Subnet Mask, now the 'Subnet Identifier' in IPv7 and IPv8.

Nevertheless, IPv8 defines a IP Addressing Structure, which is a 64 Bit IP Addressing System using only 48 Bits, that 'Defaults' to a 32 Bit IP Addressing System when the communications or transmissions are within the predefined Block Addresses of the Zone IP and IP Area Code (for the communicating entities). In other words, IPv8 retains the ease of use, implementation, and simplicity of IPv4/IPv7. All while allowing a more conservative expansion, for growth, in the number of available IP Addresses approaching the 128 BIT Addressing Format.

Moreover, while almost duplicating IPv4 in functionality, IPv8 derives its strengths from the conceptualization of "Block IP Addressing". That is, there are '4' '8 Bit Routable Address Blocks', representing four separate Octets, which are complete individual IP Addresses. And they are represented by the first 32 Bits of this 64 Bit IP Address Structure, which reserves 16 Bits, or two separate Octets, for future expansion. Furthermore, this 'Block IP Address' concept, comprises a 5 Block IP Address Division (that can be further divided to enhance the Router's overall performance). Which allows the entire IPv8 IP Addressing Schematic, when fully implemented, a greater and more direct control over the Routing (Not the Route Path) of an IP Address. Furthermore, each Zone IP Block Address is allocated approximately '1.091 x 10^12 IP Addresses' for distribution and assignment (See Table 15). Needless to say, this is only a small fraction of the total number of available IP Addresses in the IPv8 Addressing Scheme (See Table 15).

Nevertheless, this implementation in essence, allows every existing entity previously assigned an IP Address, to continue its use without any change. In fact, IPv8 is the only true Global Telecommunication System Standard, which incorporates every Industry within the Telecommunications Community into one, World Wide Global Telecommunications System, through the use of Block IP Addresses. Needless to say, what makes this all possible, is the use of the Zone IP and IP Area Code Prefixing System. Which, to say the very least, it is indeed one of the Hallmarks, that provides IPv8 its notable distinction. Moreover, it should also be clear, that IPv8 offers a smoother transition, the upgrade from IPv7, without the issues arising from incompatibilities, backward compatibility, or any of the difficulties resulting from having to learn the particulars of the implementation of a new, entirely different IP Addressing System.

A Succinct Consideration Regarding Routing in IPv6 vs. IPv8

The Routing implementations recommended in IPv8, require the development of 3 types of Smart Routers, Global, OuterCom, and InterCom. These would control 3 major methods of Routing: DIRECT-PPTP, CIODR-FEA and CIODR-BEA. Which predicts moreover, a reduction in the size of the Router's routing Table, and a reduction in the total number of Routers needing to be deployed, regardless of the size of the Network Domain. Nevertheless these routers are defined in Table AIII.

TABLE AIII

1. **Global Router: A "OuterCom' router having the dual routing path capability defined by the Zone IP and IP Area Code Block IP** Addresses (CIODR-FEA). Which is programmed to discern the differences in data types, capable encryption and decryption of data, and would route the data by either stripping the Prefix Code or transmitting the data to the next router governing the destination.

2. **Internetwork Router: A "OuterCom" router having the dual routing path capability defined by the IP Area Code Block IP Address and the** First 16 Bits defined the Subnet Identifier of the 32 Bit IP Address Block (CIODR-FEA). Which can also be programmed to discern the Differences in data types, capable of routing encrypted and decrypted data, and would route the data by either stripping its associated Prefix Code or would be By-Passed for direct routed transmissions.

3. **Network Router: A " BridgeCom" router having the dual routing path capability defined by the First 16 Bits of the 32 Bit Block IP** Address and Routing by Octets defined by the Subnet Identifier of the 32 Bit IP Address Block (CIODR-FEA). Which can be programmed to discern the differences in data types, capable of routing encrypted and decrypted data, and would route the data by using its defined functions or transmitting the data to the next router governing intended destination (CIODR-BEA).

4. **DIRECT-PPTP: An InterCom / OuterCom Transmission, which can be Routed with IP Address intact to establish a direct Secure Peer to Peer** Conference on a OuterCom, or InterCom Communication.

5. **CIODR-FEA: A Classless Inter/Outer Domain Routing Technique, which routes using, First or Second 8 Bits, of Front End of the 48 Bit** Address Blocks comprising the Zone IP, IP Area Code, and the First 2 Octets of the 32 Bit Address Block. (FEA = Front End Address)

6. **CIODR-BEA: A Classless Inter/Outer Domain Routing Technique, which routes using the Back End of the 32 Bit Address Block, that comprise** the last 2 Octets. (BEA = Back End Address)

7. **Inter-Domain Router: A "InterCom" Router is the first link outside of a Private Network Domain.**

8. **Intra-Domain Router: A "InterCom" router that is use within a Private Network Domain, and it is used to Route either InterCom or OuterCom**

communications.

Needless to say, the Routing techniques recommended for use in IPv8 are far superior to those implemented in IPv6. Where by, the routing techniques employed in IPv6 necessitate the use of "CIDR" because of the "Backward Compatibility" underpinning its IP Addressing Format. It also provides an ISP with the ability to choose a Route Path, which was formally left to the Router. However, this direct Route Control over transmissions, which is indeed a Security Risk, undermines the fundamental requirement(s) for anyone seeking individual privacy and control of the information transmitted while using this Global Thoroughfare. In addition, these methods would require, if not mandate, a serious overhead on the design and cost equipment.

Nevertheless, the benefits ascertained from the choice of IPv8 over IPv6, are indeed a reflection of its unquestionable superiority, which is an inherent feature in the foundation of the Mathematics supporting its Logical Structure. Where by, the division of an IP Address Class (or its representative; the Default Address Structure(s)), is indeed a Division of the respective Number of IP Addresses associated with the Address Class Range. In other words, it is a Mathematical determination founded upon the Logic of the Method Of Quantification, which amounts to an increase in the efficiency in the use of the Total Number of Available IP Addresses in IPv8, overall. Which is approximately '99.99...+ %' efficient, compared to IPv4's rating of less than '97%'. However, Tables AI and AII, shows no clearly discernible efficiency determination for IPv6, and its use of the Total Number of Available IP Addresses. This is because the Number of Bits used to Define its Default Addressing Structure can be 128 or more. This is an inherent problem of the IPv6 Specification, which lacks any discernible Logical Structure that ONE would conclude as being supported by, or derived from a Logically Consistent Mathematical Foundation. Even so, it could not sustain an efficiency rating 'Greater Than nor Equal to 95%', because there are 4 of the 6 pre-defined 'Default Address Class Structure(s)', in which there is an assigned Prefix that limits the use of the Total Number of available Addresses within the IPv6 IP Specification.

What this implies, is that, it is not possible for the IPv6 IP Specification to be Mathematically Consistence, nor posses any Logical Foundation based upon derivable premises, as is the case for the IPv7 and IPv8 IP Specifications. Where by, the experience gained from the Addressing Methods of IPv4, and those Mathematically derived and represented in IPv7 and IPv8, shows clearly the requirements Mandated by the Mathematical and Logical reasoning of Quantification. Which has indeed demonstrated that the Division of the Address Range into any number of Default Addressing Structure(s), or the creation of a Sub-Division of Address Classes which are associated with the Addressing System, will effect the Efficiency in the utilization of the total Number of Available IP Addresses in the

Addressing System overall. In the strict sense, what this means is that, while it is possible to create an Addressing System without the Rules of Mathematics and or Logical Reasoning, without these rules or Laws there can be No Continuity within the System itself. Needless to say, if this were not true, then IPv6 would represent the 128 Bit version of the IPv8 IP Specification.

In other words, there are Mathematical Laws in which the IPv6 IP Specification clearly violates. These Laws, which are derived from the Logic of the Method of Quantification, governs the Mathematical Operations of the Binary System which relates the Addressing Schematic to the Addressing System's Method of Enumeration. These results become the foundational Premises, which imposes a boundary or limit, that clearly defines and Determines the Structure of any IP Addressing System Schematic whose foundation is derived from the Binary System.

Appendix IV: A Succinct Proof of the Fall of the Binary System Overall, which questions the validity of Machine Language

While I may possess an intuitive understanding of the Theoretical aspects in the Mathematical and Physical Sciences. I also maintain an education in the broad spectrum of the Theoretical Subject matters encompassing these fields of study. In other words, I have elected a very simple proof to present to the general audience, that commands only an understanding of Basic Algebra and some of its laws. The argument thus presented, will provide proof that the Current Method of Enumeration in the Binary System is incorrect, and will establish beyond question that the method presented above is indeed the correct method which should be applied.

Furthermore, this presentation, it should be understood, is not the only proof that can be derived for the correction of the Error in the Method of Enumeration in the Binary System. However, it seems to be well suited overall for its intended purpose and objective, because I believe itÆs the simplest and easiest to understand.

Nevertheless, the problem concerning the Error in the Method of Enumeration in the Binary System, is not new. In fact, understanding the concept of ZERO, itself, was such a great challenge for the entire Mathematical Community, that it retains a measurable significance in the History of Mathematics in general, if not overall. Where by, it should be understood that the lack of an understanding of the difference between the concepts of Set Theory, i.e. elements of a Set, and Positive Integers. Is indeed, the problem underlying this reported Error, which is the same as not grasping or understanding the Concept of ZERO.

Needless to say, to understand how this miss representation of Zero effects the Method of Counting, one only needs to understand that the Elements of the Binary Set, '0' and '1', are Abstract Entities. Which, when combined through the rules governing their usage, are then used to represent some Number, but, they have No Numerical Value nor Meaning. In other words, the Elements of the Binary Set, might just as well have been Sheep having different Color Wool. The principle would have been the same, because if the question of "How Many Sheep?" or " How many Sheep Wool Types?" were to be posed. The answer would still be 2, which is the Number of Elements in the Binary Set. Now to build upon this foundation, from Laws Elementary Algebra:

Where by, from the Properties of Real Numbers of Elementary Algebra, the Substitution Law for Equality states: "If A = B, then A may be replaced by B and B by A, in any Mathematical Statement without altering the Truth or Falsity of the Statement." This is seen true, and does indeed support the usage and Concept of the Variable. (Which we are all so familiar.)

In other words, if we replaced the Elements of the Binary Set with another Set of Elements, which renders or provides a different appearance or graphical representation. Could we not achieve the same functional purpose as that defined in the Binary System? Where by, from the Substitution Law for Equality we have;

1. If '0' and '1' are elements of the Binary Set, {0,1}, and if There exist a condition for the ({0,1} | {0,1} = {A,B}, where '0 = A' and '1 = B', then from the Substitution Law for Equality above we can perform the noted Substitution of the respective Elements of the Binary Set without Altering the Truth of any Statement in the Binary System. (Which is by Definition Equality of Sets.)

And from the Old Method of Enumeration in the Binary System we could establish an Equality. Given by equation 2 we have;

2. ' BAA = 100 = 4 ', where '0 = A' and '1 = B', and '4' is a Positive Integer.

And while, this does not, by itself, resolve the Zero issue. What we have accomplished, is to establish an EQUALITY and One-to-One Correspondence between two Sets, {0,1} and {A,B}. Which is a valid Method of Counting in the Binary System, and the Counting method presently used. (This also is given by Definition in Set Theory.)

Nevertheless, by definition, any Set that contains NO Elements, then that Set is said to be empty, and is called the 'EMPTY SET' or 'NULL SET'. Where by definition we have;

3. "For Every Sets that Contain No Elements, the Set is said to be Empty, and is called the Empty Set or Null Set, which is represented by a Zero having a Diagonal Line Drawn through it. (And for our purposes we will Equate it to '0', the 'Integer Zero'.

Nevertheless, one can easily see the confusion that does incur, as given by 3 noted above. Especially when anyone associates the 'Null or Empty Set' represented by '0', with the Element Contained in the Binary Set; Zero, represented in the Set {0.1}. Needless to say, there exist two simple approaches which solves this dilemma.

The first approach would be a comparison between the inclusive Count of the total Number of Elements Contained in the respective Sets; i.e. the Binary Set and the Null or Empty Set. Given by equation 4 we have;

4. {0} = 'the Null or Empty Set' and {0,1} = 'the Binary Set'.

From number 4 noted above. It is clearly seen that the Null or Empty Set contains, at least for our purposes, only One Member, and is equal to Zero, which represents No Elements. However, the Binary Set contains Two Members, which is represented by the Abstract Elements, '0' and '1'. In other words, if the Null Character could represent a Member, but Not an Element. Then clearly, these Two Sets do not maintain a One-to-One Correspondence between the total Count of their Respective Members, and since the Null or Empty has No Elements, they are Not Equal. Hence, the Binary Set which contains No Elements, is Empty, and can not contain any Members Equal to the Abstract Elements, '0' or '1'. Therefore, the Binary Element '0' can not be Equal to either the 'Null of Empty Set' or to the 'Zero Integer' of Positive Numbers.

Nevertheless, the second Solution would be to Equate the Elements Contained in the Binary set to those Belonging to the Null or Empty Set using numbers 1 and 2 noted above, which is derived by Definition and the Substitution Law for Equality. Where by;

5. Since {A,B} = {0,1} then from the Substitution Law for Equality and its corresponding definition in Set Theory, we can use the Set {A,B} in lieu of the Set {0,1} and still obey the rules in the Binary System.

Where by, if the conditions given by number 6 were true;

6. {A,B} = {0} = Null or Empty Set = 0 = Zero Integer of the Positive Numbers.

Then the Binary Set would contain No Elements, and the Set {A,B} would not be Equal to the Binary Set {0,1}. In other words, these Sets are neither Equal nor Equivalent, and they are indeed Disjoint because they contain No Common Members. Hence, the conclusions deduced for the first solution, noted above, remain Valid and True.

[What this implies, when accepting the Elements of the Binary Set, {0,1}, as Abstract Entities, and not Numbers Representing the Graphical Depiction associated with the Positive Integers. Is that, a Positive Integer can be assigned or associated with the Elements of the Binary Set, in such a way, that a One-to-One Correspondence could be established, which would render a count representing the Total Number of Elements Contained in the Binary Set. Where by, such an Assignment would yield:

7. 0 = 1 , and 1 = 2, yielding an inclusive total count of 2.

Needless to say, the results shown could quite easily be used in Another argument, which would yield results that are indeed the conclusions this paper presents. However, this is a foundation for, perhaps a book, because the constraints of this draft already swell the limitations of the marginal boundaries. Notwithstanding, the apology for demanding an educational prerequisite for the audience.]

Therefore the equivalent representation in Positive Integers for the Binary Element represented in the Binary Set, {0,1}, given by 0, and defined as 00 in Chapter I, is Equal to '1'; the Positive Integer. Hence, the Null or Empty Set in the Binary System is Equal to {0}, and is Equal to the Zero Integer of the Positive Numbers. In other words, the methods of counting as depicted in Table 8, as being derived from the conclusions in Chapter I, remains valid, because there is no actual Binary Representation for the Integer '0'. Moreover, it should be understood, that the actual value of the Positive Integer, as derived in the equation noted in number 2 above, equals the Positive Integer 5, as given in Table 8 of Chapter I. Which reflects the Change in the Method of Enumeration for the Binary System.

Nevertheless, while this is a profound discovery, in itself. Regarding Assembly Language however, the Addressable Memory by Address Register Size, in Bits and Bytes, confirms the conclusions of this paper, which mandates through Logical Analysis a change in the Method of Enumeration for the Binary System. While further inspection yields as the possible reason, which eliminates errors, is that, there appears to be absolutely No association beyond the Calculation of Bits and Bytes, which use the Binary System. Moreover, in retrospect, since Machine Language is Binary, and while I doubt that the calculation of its Memory Address Register size may not be in error. I would be hard pressed not to assume the worst, especially since the underlying principle behind the concept of this language is the Mathematical Calculations involving the Binary System. And even this conclusion is drawn notwithstanding the Operating Systems or Applications, which communicates with the Language of the Machine rendering Mathematical results employing the Binary System.

Needless to say, the Results and Conclusion(s) provided herein, are indeed suggestive of a Problem far greater than those maintained by the initial objectives. Where by, it can also be concluded that, any Mathematical Computation involving either directly or indirectly, through translation or whatever, the Binary System, would be in Error. And this is a Conclusion notwithstanding the intended use or association. That is, it does not matter whether the calculations concerned a Space Probe, a Genetic Sequencer, or an IP Address. Because the Far Greater Problem not only concerns Economic issues, which is the expense inured from changing the Method of Enumeration for the Binary System in Operating Systems and Software. But emphasizes the possibility of a Fatal Error resulting from the use of the current Logic of the Binary System employed in Hardware Devices, which could result in the loss of life. This would indeed become the final result of this resounding reality if these changes are not made*.

*Note: The conclusion derived here is based upon an extreme case. Where by, the Functional Purpose and Design of Electronic Hardware is directly dependent upon the Logic of Binary System, and does not account for the results its Logical format will acquire from this change in the Method of Enumeration.

References

1. **E. Terrell (not published notarized, 1979) " The Proof of Fermat's Last Theorem: The Revolution in Mathematical** Thought" Outlines the significance of the need for a thorough understanding of the Concept of Quantification and the Concept of the Common Coefficient. These principles, as well many others, were found to maintain an unyielding importance in the Logical Analysis of Exponential Equations in Number Theory.

2. **E. Terrell (not published notarized, 1983) " The Rudiments of Finite Algebra: The Results of Quantification "** Demonstrates the use of the Exponent in Logical Analysis, not only of the Pure Arithmetic Functions of Number Theory, but Pure Logic as well. Where the Exponent was utilized in the Logical Expansion of the underlying concepts of Set Theory and the Field Postulates. The results yield; another Distributive Property (i.e. Distributive Law for Exponential Functions) and emphasized the possibility of an Alternate View of the Entire Mathematical field.

3. **G Boole (Dover publication, 1958) "An Investigation of The Laws of Thought" On which is founded The Mathematical Theories of Logic and** Probabilities; and the Logic of Computer Mathematics.

4. **R Carnap (University of Chicago Press, 1947 / 1958)** "Meaning and Necessity" A study in Semantics and Modal Logic.

5. **R Carnap (Dover Publications, 1958) " Introduction to Symbolic Logic and its Applications"**

6. **Authors: Arnett, Dulaney, Harper, Hill, Krochmal, Kuo, LeValley, McGarvey, Mellor, Miller, Orr, Ray, Rimbey, Wang,** (New Riders Publishing, 1994) " Inside TCP/IP "

7. **B Graham (AP Professional, 1996)** " TCP/IP Addressing " Lectures on the design and optimizing IP addressing.

8. **Postel, J. (ed.), "Internet Protocol - DARPA Internet Program Protocol Specification," RFC 791, USC/Information Sciences** Institute, September 1981.

**9. Cisco Systems, Inc. (Copyright 1989 - 1999) "
Internetworking Technology Overview "**

10. **S. Bradner, A. Mankin, Network Working Group of Harvard University (December 1993) " RFC 1550: IP: Next Generation (IPng)** White Paper Solicitation "

11. **RFC 791**

12. **Y. Rekhter (September 1993) RFC 1518: "An Architecture for IP Address Allocation with CIDR".**

13. **S. Bellovin (August 1994) RFC 1675: " Security Concerns for IPng"**

14. **R. Atkinson (August 1995) RFC 1825: " Security Architecture for the Internet Protocol"**

15. **R. M. Hinden (May 1995) " IP Next Generation Overview"**

Author

Eugene Terrell
24409 **Soto Road** Apt. 7
Hayward, CA. 94544-1438
Voice: 510-537-2390
E-Mail: eterrell00@netzero.net