IT Professional, Author / Researcher   E. Terrell
Internet Draft   December 1999
Category: Proposed Standard
Document: draft-terrell-ip-spec-ipv7-ipv8-addr-cls-06.txt
Expires June 08, 2000

Internet Protocol Specifications for IPv7 and IPv8 Address Classes

Status of this Memo

Conventions

Please note the font size of the Tables contained in this white paper are smaller than the expected 12 pts. However, if you are using the most current Web Browser, the View Section of the Title bar provides you with the option to either increase or decrease the font size for comfort level of viewing. (Provided that this is the HTML version.)

Moreover, the reader should also be well advised, that the Version Numbers, IPv7 and IPv8, are not version numbers assigned by IESG. They nonetheless provide convenience, which serve as the support for the underlining deliberation until such an assignment by IETF/IESG can be made.

Contents

Preface

The Internet is a tool, a growing medium, which is for the use, enjoyment and exploitation by all of Humanity. And I truly believe, it is the hope of every contributor, that we, I mean everyone, can benefit from its use.

The writing of this draft, as well as the other independent and informative works posted on Wed-Sites throughout the Internet. For the most part, are intended to provide or impart knowledge to the general and faceless public the world over. These works, via the Internet, open a Public forum for discussion and debate regarding the subject matter of their deliberation, which has never existed before. And while this is not to say, that personal feeling will or will not become an integral part of these forums. Personal feelings notwithstanding, however, they can not maintain a place in any Scientific Investigation. Nor should they become the decisive factor regarding the determination of the validity and truth of any material facts whose weight is the same. This is not to say however, that the author of such works, are not obligated to provide the essential facts and evidence that would support the foundation of subject matter they are presenting. Quite the contrary, there is a demand imposed upon all of us, the constraint inherent to time. Which commands, that we provide as much information as possible, so that every reader can understand the concepts of the presentation in the shortest amount of time.

Needless to say, the provisions, as is the foundations of this presentation, are not designed to invoke or promote personal feelings. And they shall not under any circumstances, become a subject worthy of intellectual discourse.

Nevertheless, there are several points presented in this work, which has sparked much debate and disagreement:

1. Class vs Classless System- Which are we really using?

2. The Mathematical Anomaly- Can we use what the Router uses? Or! Does the limit of 254, as applied to the Host count, apply to the Network counts as well?

3. The Expansion and Exploitation of IPv4- Is IPv7 & IPv8 logical?

4. The Difference between the Binary and Decimal Methods- What the Router must know vs what is available to the Administrators! Or- Is their respective knowledge of the IP Addresses governed by the same Laws regarding usage and implementation?

To clarify the ongoing disagreements, as noted above. I would first call to the attention of the readers, the work published by 'Craig Hunt and Robert Bruce Thompson'; "Windows NT TCP/IP Network Administration". The authors state, regarding number 1 noted above (Chapter 2, Subnets, last paragraph, page 34): "Whether the address is divided in the network and host parts by address class rules, classless address mask, or a subnet mask, the constituent parts of the address are both used to deliver the data. ..." And clearly points out the difference between the Router's view of the Bit or Binary Address numbers, and the Decimal Addresses, which impose constraints upon the Administrators (relating to numbers 2 and 4 noted above). Which implies, that the Router must know and use every number within the Address Range. However, while the Administrator can and often uses both methods, definitions limit the number of Decimal addresses available. Furthermore, regarding number 3 noted above, that is, IPv7 and IPv8. It should be understood, they are in fact the logical derivatives resulting from the expansion and exploitation of IPv4, and the gist underlining the presentation of this paper.

In other words, except for the exploitation and expansion of IPv4, and the trade-off of presenting a logically deduced structure for Supernetting the Binary or the Decimal representations: where the Subnet Bit Mask was the winner. Nothing else is new. That is, all other material presented herein is either well known, or has been presented to the readers in some form of another. Moreover, this would also account for the Mathematical Error in IPv7, which the calculated result of the Exploitation IPv7 did not yield the **2.0 x 10^9 additional IP Addresses, but an amount of available IP** Addresses identical number of available and existing in IPv4: **3.64 x 10^9. The reality of which, is that, the total number of** available IP Addresses from the Supernetting of IPv4 is equal the number of available IP Addresses in IPv7. Moreover, the proof of this final conclusion, if not considered the satisfactory result embodied in this work. It should be clearly understood, that its conclusion is indeed logically derived, and can be presented as such in a more rigorous work, which is well beyond the scope of this presentation.

Nevertheless, there is absolutely No Con's accompanying the Author's acknowledgment of his error. However, the Pro's are that, IPv7 is equal to and Logically Derived from IPv4, having only a different representation of its IP Addressing Scheme. Furthermore, its enhancement, IPv8, can be shown to maintain a greater number of available IP Addresses. Whose ease of use and implementation alone, make it a far superior IP Addressing System than IPv6. Not to mention, the applause, which is determined to be an expansion far greater than **3.64 x 10^9 addresses available in IPv7 / IPv4. Which can be equal to** either, the previously calculated total of 1.43 x 10^12 IP Addresses per Zone IP having 254 available IP Area Codes. Or 9.24 x 10^11 IP Addresses per Zone IP (254) having 254 available IP Area Codes, which is the logical derivative of IPv7. And while this presentation can only suggest IPv8 as an alternate solution in resolving the IP Addressing dilemma. It is indeed a recommendation that the choice would be that which is the Logical Derivative of IPv7.

Nevertheless, the information presented herein establishes the identity existing between IPv4 and IPv7. Which also provides an unquestionable proof, that this identity clearly shows there was never an elimination of the Class System governing IP Addressing. In which case, this also eliminates the claim of the existence of the Classless System as being false. While strengthening the call, if not demand for a more rigorous adherence to the Rules of Logic, and the need to employ the services of the Educated Professionals from noted Universities, to evaluate the works which might become a standard used by all of humanity.

Abstract

This paper is a direct result, necessitated by the correction of the mathematical anomaly that plague IPv4. Whose resolution also proposed an end to the disparities resulting from a shortage of available IP Addresses. However, the proposal did not seem to garner the unfledging support through the suggestion of an alternate IP system of addressing. Which is nothing more than an exploitation of the present IPv4 system. As presented in the paper entitled; "The Mathematical Reality of IP Addressing in IPv4 Questions the need for Another IP System of Addressing".

Needless to say, it is thought that a greater clarification of the underlining foundation of this subject matter is that which is needed. Notwithstanding my personal beliefs, that the promises made by the IT Industry itself, will not be forth coming if an adequate IP System of Addressing is not employed. Nor the mention of the hidden cost the consumer is expected to pay, which is a direct result of their knowledge regarding a clear understanding of our present technology, and the ability of the Technology to the IT Industry, which could reduce the overall cost today. All while fulfilling of the promises they made to the consumer, which becomes the reality of a future which benefits all mankind.

Nevertheless, the Overview is an attempt to provide the reader with a succinct introductory foundation of those aspects of the Internet Protocol that will change as a direct result of the implementation of either IPv7 or IPv8. In other words, I shall present only those aspects of IPv4 that deal with its methods of Addressing and its former Class Structure. However, while admitting this would be an over simplification of its functional use or purpose, and a serious reduction of an adequate explanation of a vast majority of the information that encompasses the foundation of IP Specification. It is nevertheless, seen justifiable, because the remaining aspects concerning the IP Specification will not change, and shall retain their functional use regardless of whether or not these systems are employed. However, there will not be any analysis, which would propose a mandate for implementation of either of these IP Addressing Systems, as the suitable replacement of IPv4. That is to say, not unless the foundations as presented by this work, become the Standard chosen after an extensive review and comprehensive analysis by the

members of the committee for the IESG and IETF.

In short, the analysis providing the support for a further exploitation of IPv4 has been presented, and the information provided in the remaining chapters of this paper shall entertain only the aspects of IPv7 and IPv8 which differ from that of IPv4. This however, does not include the chapter dealing with Subnetting. Especially since, there is a significant difference, and an argument can be made that would warrant not only a comparative analysis, but support for its justification as well.

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: 'The IPv4 Class Address Range'; 'The 32 Bit IP Address Format'; 'The Method for Subnetting'; 'The Principle of the Octet'; and '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 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 Equal to. 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 1.

TABLE 1.

```
                  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
```

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 2.

```
                           TABLE 2.

                  4     3     2     1
                  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
```

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 Highest Value of the Exponential Equation yielding a Positive Number, Y. Until the value of their Difference, Y, at some point, is Equal to Zero.
(Clearly Y is a Variable Integer)

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, there abounds the possibility of Error in the Calculations involving either of these systems. Especially when either of these Mathematical Systems are used to represent or determine some resulting value 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 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 of the IPv4 Representation IP Class System

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

Class B, 128- 191, Default Subnet Mask 255.255.x.x:

16,256 Networks and 64,516 Hosts: 10

Class C, 192 - 223, Default Subnet Mask 255.255.255.x:
1,032,256 Networks and 254 Hosts: 110

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, Host count not applicable

5. Class E: 240 - 254 ; Denoting Experimental, Host counts not applicable

Note: There is no Division of Classes D or E. In fact, their 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 and their, 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 organizational 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 as the grounding foundation for the overall purposes and objectives of this 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 as resulting from the lack of IP Addresses available for distribution and servicing 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 however, 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. But clearly, this is not sufficient. This is because, the processes underlining 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.

In other words, given the Class B as our example. Which has a Default Subnet Mask of 255.255.000.000. Then, given the results, as that given by equation 1a. 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, we can use any value in the range 0 - 255, to represent an IP Address, and this is regardless of whether or not the Octet is governed by the Default Subnet Number, 255.

Needless to say, regardless of the method employed, they are clearly different numerical values representing the same object, which are indeed less than the Binary value given by 2^14 (16,384). Furthermore, 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 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 underlining 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.

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. Needless to say, the foundational support of this argument is the underlining objectives found upon the Internet Draft upon which this presentation resides. Needless to say, 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 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 underlining the principles of Subnetting. However, its principles and concepts needless to say, is the foundation of which the principles underlining 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 depiction rendered by this conclusion, is summarized in Table 8 of the next chapter.)

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 is the AGGREGATION of Multiple Divisions of an IP Address Class into One Network. Whose size 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: An Overview of IPv7 the Expansion of Ipv4

The suitable replacement for IPv4 is IPv7, because it is identical, and provides a greater adherence to the rules of any logical system having an underlining mathematical foundation. Furthermore, while the differences are small modifications to its foundational structure. It is nonetheless, an exploitation and visual enhancement of IPv4. Which the analysis of Tables 4, 5, and 6, including the concepts of Supernetting, produces the results in Table 8 that provide the justification for the results of Table 9. In other words, the vast majority of the grounding principles and applications of IPv4 would be the same in IPv7.

Nonetheless, it should be reasonably clear, that a Logical Foundation is the mandated requirement for any system to maintain longevity as an Organized Hierarchical Class Structure. In which case, the words 'De FACTO' and 'De JURE' would not have any relevant significance. Which would warrant the acceptance or use, of some standard that has no rational or logical foundation of its structure or application.

Table 8.

" The Reality resulting from Supernetting, the
combination of TABLES 4 and 5 yields"

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: Without having the Default Subnet Masking 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 7.

Table 9.
"Structure of the 'IDEAL' Decimal Representation of the IP Class System"

1. **Class A-1, 1 - 126, Subnet Identifier 255.000.000.000:**
   126 Networks and 254^3 Hosts: 0
   Class A-2, 1- 126, Subnet Identifier 255.255.000.000:
   126^2 Networks and 254^2 Hosts: 0
   Class A-3, 1 - 126, Subnet Identifier 255.255.255.000:
   126^3 Networks and 254 Hosts: 0

2. **Class B-1, 128 - 191, Sublet Identifier 255.000.000.000: 64 Networks and 254^3 Hosts: 10**
   Class B-2, 128 - 191, Subnet Identifier 255.255.000.000: 64^2 Networks and 254^2 Hosts: 10
   Class B-3, 128 -191, Subnet Identifier 255.255.255.000: 64^3 Networks and 254 Hosts: 10

3. **Class C-1, 192 - 223, Subnet Identifier 255.000.000.000: 32 Networks and 254^3 Hosts: 110**
   Class C-2, 192 - 223, Subnet Identifier 255.255.000.000: 32^2 Networks and 254^2 Hosts: 110
   Class C-3, 192 - 223, Subnet Identifier 255.255.255.000: 32^3 Networks and 254 Hosts: 110

4. **Class D-1, 224 - 239, Subnet Identifier 255.000.000.000: 16 Networks and 254^3 Hosts: 1110**
   Class D-1, 224 - 239, Subnet Identifier 255.255.000.000: 16^2 Networks and 254^2 Hosts: 1110
   Class D-3, 224 - 239, Subnet Identifier 255.255.255.000: 16^3 Networks and 254 Hosts: 1110

5. **Class E-1, 240 - 254, Subnet Identifier 255.000.000.000: 15 Networks and 254^3 Hosts: 1111**
   Class E-2, 240 - 254, Subnet Identifier 255.255.000.000: 15^2 Networks and 254^2 Hosts: 1111
   Class E-3, 240 - 254, Subnet Identifier 255.255.255.000: 15^3 Networks and 254 Hosts: 1111

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 9 raises an issue, while not a major problem. It does indeed, represent a Mathematical Conflict within the of IPv7 Class Addressing Scheme, as depicted in Table 9. 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 of the Secondary Section for each IP Address Class. In other words, there would arise an error in reporting the results of the calculated totals. This can easily 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 of the second Octet from the Secondary Section of each IPv7 Class Address Schemes, with 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 - 254 total Host Count, does indeed contain all of the numbers available to be used as IP Addresses. However, this does not cripple the IPv7 Class Addressing System. Where by, the calculation of the mathematical difference between IP Address Range for each Class and the total Host count would yield the valid Address Range that can be use to calculate that total number of available IP Addresses. This however, is provided that there exist a distinction between, and definitions for the 'Default Subnet Mask', the 'Subnet Mask', and the 'Subnet Identifier', which are given below.

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 255, 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 10.

TABLE 10

{" The Laws of the Octet "}

1. **By definition, there exist 3 distinct Sections or Divisions for every IP Address Class. However, the number of Sections** or Divisions is dependent upon IP Bit Address Range defined for the IP Address.

2. **The Sections or Divisions of the IP Address Class are defined**

as: Primary, Secondary, Ternary, etcàAnd 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 the remaining Classes, B - E.)

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

4. **For every OCTET in any Section or Division of any IP Class that the Subnet Identifier does not define, can be assigned** any value in the range of 1 - 254. That is, provided that there is no succeeding Section or Division, or if, there is an OCTET in a succeeding Section or Division, whose reference is the same, then it can not be defined by the Subnet Identifier. {This is seen true, because the Octet of this Section or Division, could not be in a Succeeding Section or Division which the Subnet Identifier can define.}

5. **For every OCTET within any Section or Division of any IP Class, that is defined by the Subnet Identifier and is** preceded by a Section or Division whose reference is the same Octet. Where the case is such that, the Octet of the preceding Section or Division is not defined by the Subnet Identifier. Then the Octet of the preceding Section, or Division, can not be assigned any value as given by the IP Address Range assigned to that IP Class.

Needless to say, this situation can be further explored, through mathematical calculations. Where in the given example in this case would be Class A-1 and Class A-2.

1. **Class A-1, 1 - 126, Subnet Identifier 255.000.000.000: 126 Networks and 254^3 Hosts: 0**

2. **Class A-2, 1- 126, Subnet Identifier 255.255.000.000: 126^2 Networks and 254^2 Hosts: 10**

Nevertheless, the examination of these classes yields the conclusion. That the total number of available IP Addresses for each Class Division equals the total number of IP Addresses available for the given Address Class Range. Therefore, if Class A-1's second Octet were to maintain any of the values in the IP Address Range, 1 - 126, 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 Class Division, would be to calculate the total number of IP Addresses available from its DEFAULT structure, as outlined in Table 11 and explained in the Note that follows. Thus the value as would be determined from the calculation of the Class A-1 IP Address configuration that can not be used. As is the result of equation 3 and 4, becomes the number of available Hosts for the Division or Section of the Class for which the calculation was made.

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 available per section or division comprising that Class. In which case, our example would yield:

3. Class A-1, 1 - 126, Subnet Identifier 255.Y.X.X:
   (126 x 128 x 254 x 254) = 1,040,514,048 Networks
   {Where Y = the Range 127 - 254, inclusive}

and

4. 128 * (254)^2 = 8,258,048 Hosts: 0

Where the total number of available IP Addresses for the Class A would be that given as:

5. 126 * (254)^3 = 2,064,770,064

In other words, equation 5 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, given by the Laws of the Octet, that the total number of available Network IP Addresses assigned to Class A-1 is given by equation 6:

6. 126 x (254 - 126) x 254 x 254 = 1,040,514,048

This method is summarized in Table 11. Where the results of equation 6 **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 there continued use, which is the process now employed. This of course, also means, that for every Global IP Address Assigned, there exist a total of 8.1 x 10^6 possible Networks that can be derived.

NOTE: So not to violate the Laws of the Octet. It should be clearly understood that the last section of every Class can be represented by the Default Address given by: 255.255.ooo.ttt. (Where O = is the difference given by the equation: "254 - Y {IP Address Class Value}", and T = Total number of available IP Addresses{254}.) Where by, the total number of available Hosts, when Class A is the given example, for the last section of the Class A is given by:

7. T x O = 126 x 254 = Host Count = 32,004

Table 11.
"Reality of the Structure of the Decimal Representation for the IP Class System."(Where the Value for the variable 'Y' is given by the Laws of the Octet.)

1. **Class A-1, 1 - 126, Subnet Identifier 255.y.x.x:**
   1,040,514,048 Networks and 8,129,016 Hosts: 0
   Class A-2, 1- 126, Subnet Identifier 255.255.y.x:
   516,160,512 Networks and 32,004 Hosts
   Class A-3, 1 - 126, Subnet Identifier 255.255.255.y:
   256,048,128 Networks and 126 Hosts

2. **Class B-1, 128 - 191, Subnet Identifier 255.y.x.x:**
   784,514,560 Networks and 4,129,024 Hosts: 10
   Class B-2, 128 - 191, Subnet Identifier 255.255.y.x:
   197,672,960 Networks and 16,256 Hosts
   Class B-3, 128 -191, Subnet Identifier 255.255.255.y:
   49,807,360 Networks and 64 Hosts

3. **Class C-1, 192 - 223, Subnet Identifier 255.y.x.x:**
   458,321,664 Networks and 2,064,512 Hosts: 110
   Class C-2, 192 - 223, Subnet Identifier 255.255.y.x:
   57,741,312 Networks and 8,128 Hosts
   Class C-3, 192 - 223, Subnet Identifier 255.255.255.y:
   7,274,496 Networks and 32 Hosts

4. **Class D-1, 224 - 239, Subnet Identifier 255.y.x.x:**
   245,676,928 Networks and 1,032,256 Hosts: 1110

Class D-1, 224 - 239, Subnet Identifier 255.255.y.x:
15,475,712 Networks and 4,064 Hosts
Class D-3, 224 - 239, Subnet Identifier 255.255.255.y:
978,944 Networks and 16 Hosts

5. **Class E-1, 240 - 254, Subnet Identifier 255.y.x.x:**
231,289,860 Networks and 967,740 Hosts: 1111
Class E-2, 240 - 254, Subnet Identifier 255.255.y.x:
13,658,850 Networks and 3,810 Hosts
Class E-3, 240 - 254, Subnet Identifier 255.255.255.y:
803,250 Networks and 15 Hosts

The Rules given in Table 6 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' = '254', which represents either the Network or HOST 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 '0 - 254'. 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, if the Total Number of Available IP Addresses, as represented by the Supernetting of IPv4, is given as 3.64 x 10^9, then its exploitation IPv7, must be equal to the same amount. Where by, if we were given, as a result of Supernetting IPv4, the Equation:

8. {X | If X = 254 in 255.X.X.X, and 255.X.X.X is the format which results from this process. Where, in all situations in which 255 represent some value that indicates the IP Address Class Range for every Address Class in IPv4, then the total number of Addresses is given by 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 total that results from the Supernetting of IPv4. That is, if and only if, there exist no condition such that, 'X = N = Y'; where N = the Octet defined by the Subnet Identifier, and Y = the Octet within any given Class preceding a Section or Division of the same Class having the definition equal to N. **[Which would indeed be in violation of the Laws of the OCTET.]**

While on the other hand. When the consideration of the value of 'Y' is the issue; we have: {Y | Y = some value within the Range 0 - 254. Which is the Octet of any succeeding Section or Division having an identical Octet mapping of the Section it precedes. Where Y is not defined by the Subnet Identifier, and the preceding Section is. Then, there exists a case, where by, the Total Number of available Host IP Addresses for any given Section or division is given by Equation 7, as noted above.

However, there exist a special case for determination of the number of available Hosts in the last Section or Division of each Address Class in IPv7. Where by, the determination of the total number of available Host for each Section or Division preceding the Last Section or Division of every Address Class has no bearing on the Total number of available IP Addresses in IPv7. In other words, they are exempt from the calculated total, and could only maintain a significance, regarding IP Addressing, in IPv8.

In other words, it should be understood, as it is implied by the analysis thus far, that there would exist IP Addresses available as Hosts, which are derived from the count of the total number of IP Addresses in the last Section or Division of each Class. This conclusion is supported by equation 7, above Table 11. Where it should be understood, the values for which 'T' and 'O' can maintain is dependent upon the IP Address Range of Values which are assigned to the Class itself, and governed by the Laws of the Octet. Given by equation 9.

9. {H | H = the Total Number of available Hosts IP Addresses, which is defined by the Default IP Address as 255.255.255.y. Which is comprised of N Networks and H Hosts, is given by the equation; $255^3 = N$, and $H = y = (254 - Q)$. Where Q is the difference between the Address total and the Address Class Range.

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. Hence, the proper representation for the Host Count for the Last Section or Division for every Class would be given by the equation:

10. $[(254 - Q) = Y]$; where Q = the IP Address Range determined for the IP Address Class under question.)

Nevertheless, it should be clearly understood that the Subnetting features of Supernetting did not eliminate the IP Address Classes. In fact, it just changed the format of the structure of their IP Address, which made the Class C become more appealing to the businesses seeking Global Internetworking Connections. However,

the benefit was indeed significant to distribution and the availability of IP Addresses. This fact is evinced as a result of the Class restructuring its use ultimately produced. Which caused an increase in the number of IP Addresses available of Class B to twice its original value, and about 12 million for Class C.
However, while IPv7 does not increase this amount from its exploitation of the IPv4 32 Bit Addressing Scheme. It does however, provides unquestionable proof that the Class System still exist, and establishes a path for a smooth transition for the implementation of IPv8.

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, while IPv7 offered no increase to this count, its exploitation of IPv4, as given by Table 11, proved that the claim of the existence of the Classless System was indeed false. All while providing a more efficient use of the available IP Addresses, and offered a more stable, less redundant alternative solution for the shortages of IP Addresses than the highly taunted IPv6. Nevertheless, the Binary Representation resulting from the use of Supernetting and IPv7, is summarized in Table 12 and 13 respectively.

Table 12.
"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 13
Structure of the Binary Representation IPv7 Class System

1. Class A-1, 1 - 126, Subnet Identifier 255.000.000.000:

126 Networks and 2^24 Hosts: 0
Class A-2, 1- 126, Subnet Identifier 255.255.000.000:
2^15 Networks and 2^16 Hosts: 0
Class A-3, 1 - 126, Subnet Identifier 255.255.255.000:
2^23 Networks and 2^8 Hosts: 0

2. **Class B-1, 128 - 191, Subnet Identifier 255.000.000.000:**
2^6 Networks and 2^24 Hosts: 10
Class B-2, 128 - 191, Subnet Identifier 255.255.000.000:
2^14 Networks and 2^16 Hosts: 10
Class B-3, 128 -191, Subnet Identifier 255.255.255.000:
2^22 Networks and 2^8 Hosts: 10

3. **Class C-1, 192 - 223, Subnet Identifier 255.000.000.000:**
2^5 Networks and 2^24 Hosts: 110
Class C-2, 192 - 223, Subnet Identifier 255.255.000.000:
2^13 Networks and 2^16 Hosts: 110
Class C-3, 192 - 223, Subnet Identifier 255.255.255.000:
2^21 Networks and 2^8 Hosts: 110

4. **Class D-1, 224 - 239, Subnet Identifier 255.000.000.000:**
2^4 Networks and 2^24 Hosts: 1110
Class D-21, 224 - 239, Subnet Identifier 255.255.000.000:
2^12 Networks and 2^16 Hosts: 1110
Class D-3, 224 - 239, Subnet Identifier 255.255.255.000:
2^20 Networks and 2^8 Hosts: 1110

5. **Class E-1, 240 - 254, Subnet Identifier 255.000.000.000:**
15 Networks and 2^24 Hosts: 11110
Class E-2, 240 - 254, Subnet Identifier 255.255.000.000:
2^11 Networks and 2^16 Hosts: 11110
Class E-3, 240 - 254, Subnet Identifier 255.255.255.000:
2^19 Networks and 2^8 Hosts: 11110

Note: The number of Networks in the Primary Division of each Class, is the Quantified difference between the IP Address Range Plus 1, for each respective Class Boundary's. [(REN - RBN) + 1)]. Moreover, the Sublet Identifier, 255, has a Binary Representation of; 11111111.

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 11. 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 can now be viewed as the expansion of the IP Classes from the change in the Default Structure defining each division of the IP Class, which resulted from the use of Supernetting. However, this produced a change in all of the Structures of the IP Classes to the Default Structure as depicted for the Class A. Needless to say, this is the definitive proof that IPv7's evolution is founded upon changes made in IPv4, which compensate for the shortages in the number of available IP Addresses through the use of Supernetting.

Needless to say, these changes are the foundational premises of deductive reasoning, for the logical conclusion, which necessitates IPv7, and offers a cost free solution for the shortages in the number of available IP Addresses. In other words, IPv7 is nothing more than a 'TRANSPARENT OVERLAY' for IPv4 Addressing System, which increases the efficiency of IP Addressing, and makes absolutely no other changes to any of the underlining foundations characterizing IPv4.

Note: Other than the clarification of the functional purpose, enhanced specification for the definitions of a few terms, and the exploitation the of the of IP Classes reduced by the use of Supernetting, IPv7 only provides a greater logical Structure, because nothing else changes as a result of its implementation.

Chapter II: An Overview of IPv8 the Enhancement of Ipv7

The over all structure and organization regarding the overview of IPv8 offers no change to the foundation, as rendering a major distinction from that underlining IPv7. In other words, it is viewed as an enhancement of IPv7, which provides separate copies of the entire IP Addressing Scheme, as summarized in Table 11. Thus, allowing a broader distribution and use of an almost unlimited number of available IP Addresses for the population of the entire World. Nevertheless, this is evinced by IPv7's IP Address Totals is nearly equal to half the present World Population, which is approximately one IP Address assignment per person.

In other words, the enhancement offered by IPv8 is characterized by the use and implementation of PREFIXES to the IP Address, such as, 'Country Codes', 'Zone Codes', and 'Area Codes'. The employment of these measures not only guarantees the promises of the IT Industry, while reducing the cost of Long Distance Telephone Calls, but offers a significant boost over the use of 'CIDR' in Router performance, as shall be discussed in the next chapter.

In other words, the promises of the IT Industry encompassing the

Interactive Television, Live Video Telephone Systems, Video Teleconferencing, and the evolution of a Global Telecommunication Community which encompassed everyone having a telephone today, becomes the Reality of its Dreamers. That is to say, with the implementation of IPv8, all of the promises of the IT Industry would now depend only on the development of the technology to produce these systems.

Chapter III: 'The Header Structure in IPv7 & IPv8'

The IP Addressing Scheme of IPv7 can serve the Global Internetworking Community now. Its implementation offers some significant improvements over any system presently in use. However, while there is a learning curve, it would actually impose no challenge for the seasoned professional. In fact, there are four reasons that support the its implementation and the reality of it being the suitable replacement for IPv4.

1. **It is Identical to IPv4 in the total number of Addresses.**

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 Addressing System used in IPv4, which** changes absolutely nothing else.

4. **It is a Logical Derivative of the IPv4 Addressing System, which eliminates all** of the 'PREDEPLOYMENT' testing requirements, while providing a flawless transition to IPv8.

5. **Increase efficiency in the use of IP Addresses, because there are no IP** Addresses wasted on Host assignments. This means that every IP Address is available for assignment.

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, providing an almost seamless transition for its enhancement, IPv8.

Nevertheless, while IPv7 is called the "Global Internetworking Community", IPv8 is called the "Global Telecommunication Community". 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 ever conceived. Nevertheless, while retaining the ease of use and implementation of IPv7, IPv8 provides an available number of IP Addresses that's staggering, to say the very least. In other words, the comparable analogy would be, IPv7 can provide an IP Address to nearly every adult in the world today. While IPv8, can provide an individual IP Address to every person, the total population of the world today, on over 2.5 Billion worlds. That is to say, the people of planet Earth can colonize 2.5 Billion planets with a population equal to the existing count, and still have reserve IP Addresses.

Furthermore, while the foundations underlining IPv8 is the same as those of IPv7. There is indeed a distinction between these two systems, which accounts for the 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                   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        |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| S RESERVED   | S RESERVED   | IP S ZONE CODE | IP AREA CODE |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                          SOURCE ADDRESS                      |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| D RESERVED   | D RESERVED   | IP D ZONE CODE | IP AREA CODE |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                   DESTINATION   ADDRESS                      |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                             OPTIONS                          |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|                             DATA                             |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|--------------------------------------------------------------|
```

```
               IP Header for IPv6
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  | PRIO. |                FLOW LABEL                     |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
| PAYLOAD LENGTH                |   NEXT HEADER   | HOP LIMIT  |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|--------------------------------------------------------------|
|                                                              |
|                                                              |
|                                                              |
|                          SOURCE ADDRESS                      |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|--------------------------------------------------------------|
|                                                              |
|                   DESTINATION   ADDRESS                      |
|                                                              |
|                                                              |
|+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +|
|--------------------------------------------------------------|
|+ + + + + + + + + + + + + + + DATA + + + + + + + + + + + + + + |
|--------------------------------------------------------------|
```

Nevertheless, the obvious lack of a detailed analysis of the Headers reduces the IPv8 Header to one being that of a suggestion. However, it is clear that IPv4 and IPv7 can share the same Header. But, from the structure as offered as choice for the Header of IPv8, an explanation is indeed warranted. 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 same as that given for IPv7. The distinction 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.

Where by, above the Source Address Section exist another 32 Bit Section, which is divided into 4 distinct and separately defined Octets. 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 has 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 the same as that governing the IP System of Address. While the Structure of this addressing system is given by Figure 6.

FIGURE 6

1. Source Addressing Structure: 255:255:255.000.000.000

2. Source Addressing Structure: 255:255:255.255.000.000

3. Source Addressing Structure: 255:255:255.255.255.000

4. Destination Addressing Structure: 255:255:255.000.000.000

5. Destination Addressing Structure: 255:255:255.255.000.000

6. Destination Addressing Structure: 255:255:255.255.255.000

Notice that the Primary, Secondary, and Ternary IP Address Classes are also shown in addition to that of the Zone and IP Address Area Codes for the Source and Destination Addresses. Furthermore, it should be clear that each Octet preceding the IP Address is separated by a Colon, which not only indicates their distinction but an order of precedence as well.

In other words, the establishment of a sequential order is another boon for IPv8. Especially when considering the Routing and networking implications. Where by, CIDR attempts to improve Router performance through the use of the Subnet Mask 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. Where by, Router's become more specialized Address Forwarding Computers, consisting of three divisions, the Global, the Internetwork, and the Network. These three divisions serve to reduce the Router's Table, reduce Traffic, and enhance System Management. These benefits are accomplished by programming the Routers to Route using the Front End of the IP Addresses. Thus, achieving a significant Router performance, which is a far superior improvement over that which can be achieved using the CIDR technique.

The reality of these benefits becomes even clearer when an understanding of Front End Addressing achieved. That is, the Network Router checks first the Zone Address, then the IP AREA CODE Address. This allows the Router to determine if the communication is an Intercom or an Outercom. In which case, if it is Outercom, the Router needs only to know the location, and or Hop Count, of the nearest Internetworking or Global Router. Which need only be 2 or 3 connecting Routes beyond the single Point of Failure.

However, while all Intercom communications are Routed as belonging somewhere within the Domain of its Network. The only the communications destine to either the Global or the Internetworking Telecommunication Community would need to access the Global or Internetworking Routers, which are located outside the Domain of the Network. Furthermore, while the Global and Internetworking Routers employ similar, but the reverse techniques of CIDR, the One Route Thoroughfare for Multi IP Address Access. The Back End of the IP Address is not considered until the IP Packet reaches the Gateway Router of its intended Destination. This clearly offers a boon for the Telecommunications Internetworking Industry, because the Router's in place now, only need an up grade of the IOS to perform these tasks.

Notwithstanding the obvious benefits, if IPv8 is implemented as the Standard for the Global Telecommunication System Interface. A simple IP Address can become, as planned, the replacement for the Telephone Numbers in use today, because software could be used to eliminate the need for anyone to maintain the obligation of having to remember any number beyond 15 digits. That is, their IP Address and its associated IP Address Area Code Prefix.

Nevertheless, it should be very clear, by now, that there can exist **254 Zones, which could result in the independent implementation of** the entire IPv8 Addressing Scheme that could have 254 IP Address Area Codes for each IP Address Class and their associated Divisions. Needless to say, while the implementation of IPv8 does noting in the elimination of Subnetting. It does however question, because of the staggering number of IP Addresses available, the need for Supernetting. Especially since, only the IP Addresses assigned to the individual, which is accompanied by its Zone and IP Address Area Code, could have or maintained access to the Global Telecommunications System.

Chapter IV: The Principles of Subnetting in IPv7 & IPv8

The concepts and principles which underline the methods of Subnetting and its derivative, Supernetting, will not change. However, there are some additional definitions and laws regarding their usage in IPv7 and IPv8. Nevertheless, these Laws and Definitions is a direct consequence of the information provided in the Overview, Table 10, and the definitions derived in Chapter I.

Definitions

1. **By Definition, every IP BIT Address is divided into sections called OCTETS. Where the first OCTET of any IP Bit Address must** be Defined by the Subnet Identifier, and each Octet equals 8 Binary representations of either One's or Zero's that can collectively be Translated into one Decimal (Integer) Number.

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 being equal to the resulting Difference Of Success Subtractions of the Binary number 1 = 2^0 = X and is given by the Equation: [SM = 2^7 - X]. Where by, the Subnet Mask = SM, and given by the Difference of each successive Subtraction of 2^0.

3. **Every Network IP Address may contain at least one Subnet Mask. Where the Total Number of Subnet Mask that it can have, depend** on the IP Bit Address Range Minus the first Octet in of the IP Address.

4. **For every IP Address, having one or more Octets defined by the Subnet Identifier, also defines any IP Network Address which can** be Subnetted. 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 every OCTET in the IP Bit Address Range is not defined by the Subnet Identifier. (Where the Subnet Identifier is equal to: 11111111 = 255; The Binary and Decimal Equivalents.).

5. **Every Network IP Address having an Octet defined by a Subnet Mask, can be subdivided into only 1 Sub-Network. In which, there are** a total of 7 possible logical Sub-Networks that may be defined.

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 of the derived Sub-Network IP Addresses.

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 4. Where by, given 2^7 = 11111111 = 255, is the Minuend, then successive Subtractions of 2^0 = 00000001 = the Subtrahend from the resulting Difference is equal to the Summary in Table 7.

Figure 4

1. 11111111 - 00000001 = 11111110 = 254
2. 11111110 - 00000001 = 11111100 = 252
3. 11111100 - 00000001 = 11111000 = 248
4. 11111000 - 00000001 = 11110000 = 240
5. 11110000 - 00000001 = 11100000 = 224
6. 11100000 - 00000001 = 11000000 = 192
7. 11000000 - 00000001 = 10000000 = 128
8. 10000000 - 00000001 = 00000000 = 0
9. 11111111 - 11111111 = 00000000 = 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
(Modification of Table 7 noted above)

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

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

Nevertheless, since there exist a Total Count of 256 Decimal (Integers) representations expressing the total Number of available IP Addresses. That is, since this is an inclusive count of the given Range 0 - 255. Where by, equation 1, which enumerates this inclusive count, establish the Total number of IP Addresses in the Range '0 - 255'.

1. [(255 - 0) + 1] = 256.

Moreover, this is also the Binary Representation, which equal of the inclusive count for the total addresses in the 0 - 255 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. Where by, 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 would be given by the equation 2.

2. [65,536 / 128 = 512]

Furthermore, if the concept of Supernetting, was the Subnetting of the only Host Octet available in the Class C. Then, the total of IP Host Bit Addresses available, given a Least Significant Digit of 128, is equal to 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 render any provisions to Subnet the only Host Octet available in the Class C. Needless to say, these conclusion clearly justifiable. Nonetheless, the change to the IP Address Skeleton of each Class as summarized in Table 8, and represents the structure of Class A.

Notwithstanding, the Definitions and Laws defining the Internet Protocol Specifications for IPv7 and IPv8, which regarding their implementation, would 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 are the lasts two within the IP Address. While Supernetting, is now defined as the process of Subentting 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.

However, these changes do not usher any significant change, which would be a major departure from the foundational concepts of IPv4. In other words, except for the laws, definitions, and the resulting constraints imposed, the information provided herein, is the same as that which governed IPv4. Nevertheless, the Tables below summarize the logical format, which outlines the results of the concepts of Subnetting and Supernetting in IPv7 and IPv8.

```
                              TABLE 14

Decimal & Subnets:  Binary Result:  Difference Factor:    LSD:
      /    ^    \       / ^ \       /     ^        \       ^
     /     |     \     /  |  \     /      |         \      |
    /      v      \   /   v   \   /       v          \    /v\
 1.(256 - 128) = 128 = 10000000, 256/128 - 128/128 = 1    2^7
 2. 256 - 192  =  64 = 01000000, 256/64  - 192/64  = 1    2^6
 3. 256 - 224  =  32 = 00100000, 256/32  - 224/32  = 1    2^5
 4. 256 - 240  =  16 = 00010000, 256/16  - 240/16  = 1    2^4
 5. 256 - 248  =   8 = 00001000, 256/8   - 248/8   = 1    2^3
 6. 256 - 252  =   4 = 00000100, 256/4   - 252/4   = 1    2^2
 7. 256 - 254  =   2 = 00000010, 256/2   - 254/2   = 1    2^1


                         TABLE 15
          Subnetting Results in IPv7 and IPv8

 Number:      Binary     Equation to Determine      Available
Bit Hosts: Equivalent:     Subnet Bit Mask           Hosts
  / | \      /|\        /       |          \           |
1. 512 =     2^9       (16 - 9  = 7) + 16 = 23         508
2. 1024 =    2^10      (16 - 10 = 6) + 16 = 22        1016
3. 2048 =    2^11      (16 - 11 = 5) + 16 = 21        2032
4. 4096 =    2^12      (16 - 12 = 4) + 16 = 20        4064
5. 8192 =    2^13      (16 - 13 = 3) + 16 = 19        8128
6. 16,384 = 2^14       (16 - 14 = 2) + 16 = 18      16,256
7. 32,768 = 2^15       (16 - 15 = 1) + 16 = 17      32,508


                           TABLE 16
             Supernetting Results in IPv7 and IPv8

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

Chapter V Conclusion: 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. Needless to say, the addition of a more stringent adherence to the rules of Logic will, to most, seem beneficial. However, while the growth in the number of available IP Addresses, that are available for assignment and distribution remains unchanged from that provided by Supernetting. Clearly, IPv7 will usher a more stable growth, as a result of the implementation of IPv8 to the Global Telecommunications Community. Moreover, while mistakes are unavoidable, they will not be an inherent part of the structure of this Addressing System. This is evident from its structure, where most of the subnetting now employed are an inherent part of its addressing scheme.

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 Underlining Foundations of the Entire Telecommunication Industry.

I mean, just think for a moment. Where, something as simple as the 'Junction Box', 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. However, while this says nothing about the changes and benefits that its implementation offers the producer's of Networking equipment, or any of its associated Hardware and Software. It does nonetheless, bespeaks clearly about the promises and benefits of IPv8, which is indeed an endless reality bound only by the limits of our imagination.

Security: The Relationship between IPv7 & IPv4, and the Suggested / 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, which 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, since 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 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 255:255:255.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 we 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 her location on 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 some sequence of the Network IP Address 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 3 types of Routers to control IP routing and Security; the IntraDomain Router (InterCom Router), the Internetworking Router (OuterCom Router), and a 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. 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, or that which has the correct 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 Comm 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.

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 recommendations. 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 not say, IPv8 can be used, or implemented, without extensive testing. Because even I would not recommend this, regardless of the standing similarities is has with IPv7 and 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 from the multitude of possibilities is chosen 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, and not 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.

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

```
======================================================================
= Octets     2st   3nd   4rd                  Figure 1
=             |     |  .......
=             |     |  .     .
= -----       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 - 254    ...................  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 . 254 .  Integer representing the IP Address,
=   |       ...................  and has only 1 value that occupies
=   |       ...................  the given Octet. However, the Binary
=   |       .     .     .        representation for the IP Address, is
=   |       . 254 . 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,
=                 . 254 .        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 (254 Locations), and the IP AREA CODE allows for a further expansion or division of each IP Address Class (254 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 Mathematical Anomaly Explained

Nonetheless, this mathematical issue is an argument concerning, whether or not there exist a 'One-to-One' Correspondence between the Mathematical Calculations involving the Decimals (represented as Integers) and those concerning the Binary Operators (Logical Expressions; the Truth Table values of 1's and 0's). Needless to say, this Mathematical Anomaly becomes even more apparent when one observes the Class B situation. Where by:

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 (Integers) Numbers is completed. That is, the result would yield 64 Binary Numerical Representations, ONE for each of the Decimal numbers (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
   9Which 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 (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, if an argument regarding the difference existing with the flux in the variable range of the Second Octet, having any value in the range 0 - 254, were not possible. In which case, the result of 2a, as noted above, would be given as,
64 x 255 = 16,256. Needless to say, the count given by the Binary representation in 1a, noted above, is still wrong! Nevertheless, this situation was indeed revealed in Chapter 4.

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 (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 Integers.

Needless to say, if you are confused or are in doubt of these conclusions. Then my suggestion, would be to present my findings to a Professor of Mathematics at some well established university.

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 did 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. Needless to say, its expansion is not only redundant, but the definitions outlining its underlining purpose lack the soundness of logical reasoning, and they are indeed superfluous.

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 '3.4 x 10^38'. Which is, given the total population of the world as being '6.0 x 10^9', approximately equal to assigning 5.6 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 however, 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.

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 of the MANY SKELETAL (Default) STRUCTURES an IP Address can have in IPv6. Needless to say, these structures form the bases for the foundation of another, yet undefined Class System, which uses WORDS to define different segments of the Skeletal (Default) IP Address. Furthermore, they exhibit and maintain a repetitive definition having the same overall purpose, which was achieved in the simpler methods of 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 IPv8.

Nevertheless, IPv8 defines a IP Addressing Structure, which is a 48 Bit IP Addressing System, 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.

Moreover, while almost duplicating IPv4 in functionality, IPv8 derives its strengths from the conceptualization of "Block IP Addressing". Where by, each Block is 8 Bits in length, representing one Octet, which is a complete IP Address comprising the first 32 Bits, 16 of which are reserved for future expansion. Notwithstanding that, it is the 'Block IP Address' concept, comprising a 5 Block IP Address Division. Which allows the entire IPv8 IP Addressing Schematic to be fully implemented, for each Zone IP Address in which it is assigned. Moreover, each Zone IP Block Address is allocated approximately '1.42 x 10^12 IP Addresses' for distribution and assignment. However, this accounts only for the number of available IP Addresses in the first 3 IP Address Classes of this 5 IP Class Addressing Scheme. Nevertheless, this implementation in essence, allows every existing entity previously assigned an IP Address, to continued its use without any change.

In fact, IPv8 is a true Global Telecommunication System Standard, because it 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, is indeed the Hallmark of IPv8. Moreover, it should be clear, IPv8 offers a smoother transition without issues arising from incompatibilities, backward compatibility, or the difficulties in the learning curve resulting from 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-PP, 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 router having the dual routing path capability defined by the Zone** IP and IP Area Code Block IP Addresses (CIODR-FEA). Which can be programmed to discern the differences in data types, capable of encrypt and decrypt of data, and would route the data by either stripping the Prefix Code or transmitting the data to the next router governing the Prefix Code of the intended destination.

2. **OuterCom Router: A router having the dual routing path capability defined by the IP Area** Code Block IP Address and the First Octet of the 32 Bit IP Address Block (CIODR-FEA). Which can be programmed to discern the differences in data types, capable of encrypt and decrypt of

data, and would route the data by either stripping the Prefix Code or transmitting the data to the next router governing the Prefix or Octet of the Address Block of the intended destination.

3. **InterCom Router: A router having the dual routing path capability defined by the First** Octet 32 Bit IP Address and the Second Octet of the 32 Bit IP Address Block (CIODR-FEA). Which can be programmed to discern the differences in data types, capable of encrypt and decrypt of data, and would route the data by either Forwarding (First Octet) or transmitting the data to the next router governing the Subnet of the 32 Bit IP Address Block of the intended destination, which would then route using CIODR-BEA (CIDR having expanded capabilities for connection to CIODR-FEA).

4. **DIRECT-PP: An InterCom, or InterDomain Transmission, which can be Router or Server** Controlled, establishes a Peer to Peer or a Conference on a Network or InterCom Communication.

5. **CIODR-FEA: A Classless Inter/Outer Domain Routing Technique, which routes using the** 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)

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 IP Default Addressing Format, and also use a method in which an ISP can control the users transmission through router selection and path. These methods clearly, would require if not mandate, a serious overhead on equipment design and cost.

Nevertheless, the unquestionable benefits in the choice of IPv8 over IPv6, is the resounding voice of its superiority.

Note: The information obtained and used for IPv6 in this

comparison with IPv8 was derived from that noted by
number 16 in the Reference Section. Which may or may
not be up to date, but it does indeed serve the purpose
of this Appendix.

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 underlining concepts of Set Theory and the Field Postulates. The results yield; another Distributive Property (i.e. Distributive Law) 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
(Please comment to:)

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