GP/E Protocol for a Wireless Network

Status of this Memo

Abstract

This memo defines Global Postion/Encryption Protocol (GP/EP), a proposal for a universal wireless computer network. Global position is defined as region in space-time. The network routes data to a global position using routing information provided as part of the protocol data and proposes use of encryption algorithms to prevent unauthorised access.
This protocol is proposed as an alternative for IP, the Internet Protocol. The memo also describes how a network can work with no real network address other than its global position in the universe.

Acknowledgements

Thanks are always due to the only One who taught me all that I know.

0. Conventions

Throughout this document the first character/word after '-' should be treated as if it is a subscript. For example N-1 implies N subscript One, read as N1.

1. The Protocol

Global Position/Encryption protocol(GPE) is defined by a set of vectors N, where each N represents a node on the Network.
Thus GPE = {N-source, N-1, N-2,...N-n} where n is an integer greater than or equal to 1.
The data on the network would travel from N-source to N-1 and then from N-1 to N-2 and so on until it reaches N-n.

1.1 Node Parameters

Each Node vector N is a 3-tuple(GP,R,E) representing the maximum parameters required for any data to be transmitted over the network.

N = (GP, R, E) where
GP represents the global position of the Node
R represents the path/route of data travesal
and E represents the Encryption object

No attempt has been made in this document to propose a physical representation for these three parameters. Instead, each one is treated as an object by itself and a set of minimum required characteristics are defined. Any implementation of these objects should neccessarily support the all the characteristics.

2. Global Position Object (GP)

The purpose of this object is to encapsulate all the relevant data required to identify a region in the space time continuum. This region could be anything from a single unique point to the whole universe in space time and may or may not be contiguous.

2.1 GP Properties.

A GP object should have the following properties. It should

1) provide a facility to identify the space independent values it represents
2) provide a facility to identify the time independent values it represents.
3) provide means to compare with another GP object and determine if the compared object shares any Global Positions with it.

2.2 GP Constants

Some special instances of GP objects are defined next and are called GP constants.

GP-null : GP-null is a global position that exists nowhere on the network. Thus every point in space time outside of the network is a GP-null. Also, if two GP objects share no Global Positions between them, then the intersection of those two GP objects is said to be GP-null

GP-max : GP-max is defined as global position that covers the entire network. Thus every point in space time covered by the network is a subset of GP-max.

GP-univ : GP-univ is the union of GP-max and GP-null

GP-const : GP-const is defined as a time independent global position value.

3.0 Route Object (R)

The purpose of this object is to derive a path between two Global Positions. A Route object operates on two Global Positions GP-source and GP-dest and helps create G-route, a set of Global Position {G-i's} where each G-i is a complete path from some subset of GP-source to a subset of GP-dest. Thus

G-route = R(GP-source, GP-dest) = {G-1, G-2,..G-i,..G-m} m>=1

To understand how this Route object can be used to route data from one Node in the network to another, a new object called Router is defined next.

3.1 Router

A Router is defined as an entity that propagates network data from one Node on the network to another. Router objects travel in space time and keep themselves updated with their Global Postions at any given point in time. A Router object propogates data by performing three functions : Listen, Analyse, and Send.

3.2 Traversal of Network data

Listen :

Listening is defined as the process of receiving the data to be propagated and extracting GPE protocol associated with the received data. The entire data received is represented as Data-R. The Router then passes the GPE information extracted to its GPE analyser.

Analyse :

The Analyser operates as follow :

1. The GPE extracted during the Receiving process is of the form
   GPE = {N-source, N-1, N-2,....N-n} where 'n' is an integer
   and n >= 1
   and N-n = (Gp-n, R-n, E-n)
   and N-source = (GP-source, R-source, E-source)

2. The analyser then creates a G-route from GP-source to GP-1 using the Route object R-1. Where GP-1 and R-1 belong to N-1. Thus G-route = R-1(GP-source, GP-1) = {G-1,G-2,...G-m} m >=1

3. The analyser then compares its own Global Postion GP-R with each of the G-i's generated above. The comparision works as given below :

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For each G-i belonging to G-route
    If GP-R intersection G-i is GP-null
<======= Proceed to next G-i
    end-if
    Call Send(Data-R), where Send is as defined next.
<====== Exit processing the G-i loop
    Next G-i
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Send :

The send process throws Data-R back into network with a minor but a crucial modification. It replaces the GP-source value of Data-R's GPE protocol with the router's Global Position GP-R. Thus the new GPE protocol will be

GPE = {N-source, N-1, N-2,...N-n} n >=1
where N-source = (GP-R, R-source, E-source)

4.0 Encryption Object

The purpose of encryption object E-i is to help node N-i identify the decryption process required to translate the received data. A node N-i on the network identifies its incomming data by comparing the GP-i mentioned in the incomming data with its own GP-node and if the intersection of the GP-i with GP-node is GP-Null the data is discarded. If not Null it checks to see if the Encryption object E-i is supported by the Node. A well behaved node on the network would publish a set of encryption methods and would listen for only those data that contains the Encryption obect that it supports.

To understand how such a protocol could be implemented, a network with a compromised version of the GPE protocol is proposed next.

5.0 Two-mile GPE network.

5.1 Assumptions.

The following assumptions are made regarding the network.

1. It is possible to design a router object by combining a GPS receiver, a two mile hand held walkie-talkie transmitter, and a personal computer, all of which can be found at your local radio shack. Ofcourse, I do not know how to link them yet. But that is a job for somebody else.

2. The availability of Global Postioning Satellite services is gauranteed in GP-max whenever the network is required to be up.

3. There are plenty of volunteers with the routers mentioned above and covering the entire GP-max for every mile and half on land.

4. Software implementation of the GPE protocol will follow the rules mentioned next.

5.2 GPE for the Two-mile routing network

GP defenition :

The representation of this object can follow the notations used by Global Positioning Satellite systems, for locating a point on earth's surface. The time part of this object is irrelevant for this network. For the purpose of discussion, the earth's surface will be viewed as a two dimensional area spread out from end to end.

Route Defenition :

The route object is defined by 'theta' a value in radians. A path is derived from GP-source to node N-i as follows :

The path is defined as an area inside the triangle defined below :

1. One vertex of this triangle is at GP-source.
2. The angle at the vertex at GP-source is theta
3. The perpendicular drawn from the vertex at GP-source to the base of the triangle, meets the base at GP-i, the global position of Node-i.

Encryption :
Every node on the network will publish a unique public key. Everyone who sends data to a node is expected to mention the Node's published public key in the Encryption object and encrypt the data being sent using the public key.

Router Object :
Every computer on this network is both a router and a node. The router is designed as mentioned in the assumptions. The router object derives a path from GP-source to another node N as mentioned in the Route description. The following constraints are enforced on the Router object :

1. If GP-router intersection GP-i is not Null, where GP-router is the global position of the router and GP-i is global position of the Node to which the incomming data is sent to, then the router will not perform the Send operation on this data.
2. As the data nears its destination Node there will be an echo as the same data will be picked up by multiple routers and passed back and forth. To avoid this, the Node would send a message over the network informing all routers the receipt of a data sent by them. The routers should stop listening to those data that are already received by the Node it has been addressed to. The actual implementation of this is not discussed in this document.

6. Security Considerations

Security issues are not discussed in this memo.

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