

Internet Draft
Category: Proposed Standard
Expires: October 27th, 2006

E. Terrell
ETT-R&D Publications
April 2006

**The CIDR Network Descriptor expands the size of the IPtX Address
Space beyond the IPv6 IP Addressing Specification**

'draft-terrell-cidr-net-descript-expands-iptx-add-spc-01.pdf'

Status of this Memo

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts. Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at

<http://www.ietf.org/ietf/lid-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at

<http://www.ietf.org/shadow.html>.

Intellectual Property Rights (IPR) Statement

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed and any of which he or she becomes aware will be disclosed, in accordance with Section 6 of BCP 79.

Conventions

Please note, some of the mathematical operators that cannot be represented in a 'txt' file format, such as the '^' Carrot sign for super-script, or 'v' for sub-script, that must be used to represent the Mathematical Operator involving an Exponential Operation.

This Internet-Draft will expire on October 27th, 2006.

Abstract

This document provides the final clarification of the conclusions resulting in the expansion of 'RFC 1518 and 1519', which redefines the 'CIDR' notation as the 'Network Descriptor', and proves that the IP Address Pool of the IPtX Specification is greater than IPv6. In other words, IPtX is a more powerful and cost effective IP Addressing Specification, which allows the interface of the "Front-End" to mimic or simulate the IPv4 Specification, a 32 Bit-Mapped IP Address, in the Backbone environment of an unlimited size IP Address Space.

Introduction

The "CIDR" Concepts, the 'Network Descriptor' and the 'Bit-Mapped' IP Address, provided the bases for the comparison between IPv4, IPv6, and the IPtX IP Addressing Specifications, which concluded that these are different expressions of equal definitions. That is, mathematically speaking, the IP Address Pools of the IPv4 and the IPv6 Specifications, mathematically defines the variable Coefficient of an Identical Base Pool of IP Addresses, or $X(2^{32})$; given that 'X' respectively equals '1' and 7.9228163×10^{28} .

Where $IPv4 = 1(2^{32})$; and the 128 Bit IPv6 $\approx 7.9228163 \times 10^{28} (2^{32}) = 2^{128} = (2^{32})^4$.

However, the IP Address Pool for the IPtX Specification is mathematically defined by the equation:

$$IPtX = X(2^{32}) + 16,500,000.$$

Nevertheless, these additional IP Addresses, because only the "Network Descriptors" are different, (approximately 16.5 Million Shared) are Host or Client IP Addresses, which cannot be used to establish a direct Internet Connection because of the Logic problems, the decisional conflicts with the Routers. In other words, the expansion of the 'CIDR' concept(s), which mathematically defines the expression; $X(2^{32})$, can only provide a Bit-Map that uniquely Identifies every IP Address within every Address Class, or the IP Address Range the expression defines, essentially availing the entire Range of IP Addresses to the Global-Net.

Table of Contents

Abstract

Introduction

- 1. The Classless Inter-Domain Routing Architecture, or CIDR**
- 2. The Interpretation of the conclusions Expansion of 'CIDR';
Defining the "Network Descriptor"**
- 3. The IPtX and IPv4 IP Addressing Schemes – 100% Compatibility**
- 4. The Structural Comparison - IPv6 vs. IPtX**
- 5. Security Considerations**
- 6. IANA Considerations**
- 7. References**

1. The Classless Inter-Domain Routing Architecture, or CIDR

The Classless Inter-Domain Routing Architecture, or CIDR, was derived from the so called; "strategies for address assignment of the existing IP address space with a view to conserve the address space and stem the explosive growth of routing tables in default-route-free routers" [9]. It was in reality, an Expansion of the 'Default Addressing Structures' existing in the Address Class System. The popular claim nevertheless, boasted the elimination of the Address Class System. These Claims needless to say, were fashioned by the Authors, whose works represented their personal interpretation(s), because the works comprising RFC's 1517, 1518, and 1519 were never fully understood. The truth nonetheless, was clearly explained in RFC 1519, whose discourse dealt specifically with the way the Routers, and the Routing Protocols interpreted, or dealt with the IP Address, and not the elimination of the Address Class System per se. In other words, the Routers and the Routing Protocols were limited to using only the 'Default Addressing Formats', which represented Class A, Class B, and the Class C Addressing Specification. And to deal with the prospect, or the possibility of an IP Addressing Shortage, a plan was devised (RFC's 1517, 1518, and 1519), which actually involved not only the initial 'Default Addressing Formats', from Class A, B, and C, but the remaining fractional subcomponents from each of their respective Octets as well. In fact, while RFC 1519 specifically designed the CIDR Architecture to take advantage of Class C, it did not weaver in its mention of the same implementation for the Class A Specification. It could be said in other words, that the CIDR Architecture represents an Un-Finished version of the 'IPtX Protocol Family Specification'. However, because of the MISNOMER, 'CLASSLESS', the process of SUB-DIVIDING a Class (In particular; Class A, and Class C), was never fully understood. Hence, the CIDR Architecture is the Sub-division of a CLASS SYSTEM, or a Class Addressing System that has been SUB-DIVIDED, which represents the Class, or the Whole, having a Greater Number of Constituents.

In other words, the CIDR Architecture actually represents: The 'Inter-Domain IP Bit Mapped Address Routing Architecture'. Because this, in essence, is what is really happening to the IP Address, and this is the IP Addressing Format that the Router and the Routing Protocols are dealing with. Therefore, the Class Addressing System is a format that implements a Network IP Address using a specified number of BITS, and in this case, it is either '8', '16', '24', or '32' Bits. Needless to say, any further Sub-Division, or use of some Smaller Portion or Constituent, does not constitute a departure nor eliminate the Existence of the Address Class System. Hence, the CIDR Architecture actually reinforced the Class Concept and proved that, without changing the entire Addressing Architecture defining the 'IP Bit Mapped Address or the IP Bit Mapped Address Space', the Whole is indeed the Sum of its Parts.

2. The Interpretation of the conclusion's Expansion of 'CIDR'; Defining the "Network Descriptor"

When defining the New 'CIDR' Architecture as representing the collective Extension for RFC's 1517, 1518, and 1519, we must first list the functional components, or Highlights, noted as the objectives or purpose supporting each of these papers, individually. That is, there must be comparison between the definition or description of the functional purpose of the 'CIDR' Architecture as represented in each of these papers, compared with the New 'CIDR' Architecture this paper actually represents.

RFC 1517 (Maintained promoted a fear of IP Address Loss, and Astronomical growth in the size of the Routing Tables):

- "- Exhaustion of the class-B network address space. One fundamental cause of this problem is the lack of a network class of a size that is appropriate for a mid-sized organization. Class-C, with a maximum of 254 host addresses, is too small, while class-B, which allows up to 65534 addresses, is too large to be densely populated. The result is inefficient utilization of class-B network numbers.**
- Routing information overload. The size and rate of growth of the routing tables in Internet routers is beyond the ability of current software (and people) to effectively manage.**
- Eventual exhaustion of IP network numbers."**

Argument in Opposition (Justification of the New 'CIDR' Architecture):

Clearly, using the expanded 'CIDR' Architecture, when using the 'CIDR' Network Descriptor, the Reality of IP Address Exhaustion now defines a wasted use of IP Addresses. In other words, Viable IP Address that could have been use to establish an Internet Connection, Connecting the Network's Backbone-Domain to the Internet, were assigned for the Host IP Addresses. This is further clarified by a Comparison of the "Internet Protocol v4 Address Space, and the use of the CIDR Network Descriptor displayed in Table I:

TABLE I

IPtX - Internet Protocol t1 Address Space INDEX

IPaddNum = Network IP Address

CIDRNetDescrip = CIDR Network Descriptor

Current Number of IP Network Addresses Issued

Accounts for = 253 IP Network Addresses

Class A	CIDR Network Descriptor
A-1: Issued = 127 , Remaining = 1,040,513,921	/0000:08
A-2: Issued = None, Remaining = 516,160,512	/0000:16
A-3: Issued = None, Remaining = 256,048,128	/0000:24
A-4: Issued = None, Remaining = 252,047,376	/0000:32

TABLE I

Class B	CIDR Network Descriptor
B-1: Issued = 64 , Remaining = 784,514,496	/1000:08
B-2: Issued = None, Remaining = 197,672,960	/1000:16
B-3: Issued = None, Remaining = 49,807,360	/1000:24
B-4: Issued = None, Remaining = 16,777,216	/1000:32
Class C	
C-1: Issued = 32 , Remaining = 458,321,632	/1100:08
C-2: Issued = None, Remaining = 57,741,312	/1100:16
C-3: Issued = None, Remaining = 7,274,496	/1100:24
C-4: Issued = None, Remaining = 1,048,576	/1100:32

TABLE I

Class D	CIDR Network Descriptor
D-1: Issued = 16 , Remaining = 245,676,912	/1110:08
D-2: Issued = None, Remaining = 15,475,712	/1110:16
D-3: Issued = None, Remaining = 974,848	/1110:24
D-4: Issued = None, Remaining = 65,536	/1110:32
Class E	
E-1: Issued = 15 , Remaining = 231,289,845	/1111:08
E-2: Issued = None, Remaining = 13,658,850	/1111:16
E-3: Issued = None, Remaining = 806,625	/1111:24
E-4: Issued = None, Remaining = 50,625	/1111:32

RFC 1518 (Which deals more with the actual Structure of the Internet, or its Hierarchical Structure , and IP Address allocation and Routing, than the actual 'CIDR' Architecture) where by, the points are specified as:

There are two aspects of interest when discussing IP address allocation within the Internet. The first is the set of administrative requirements for obtaining and allocating IP addresses; the second is the technical aspect of such assignments, having largely to do with routing, both within a routing domain (intra-domain routing) and between routing domains (inter-domain routing). This paper focuses on the technical issues.

The architecture and recommendations in this paper are oriented primarily toward the large-scale division of IP address allocation in the Internet.

IP Addresses and Routing

Efficiency versus Decentralized Control

IP Address Administration and Routing in the Internet

Administration of IP addresses within a domain

Indirect Providers (Backbones)*

Continental aggregation*

Argument in Opposition (Justification of the New 'CIDR' Architecture):

While there is a lot that can be said regarding RFC 1518, especially since this is a proposal which advocates a great deal of dependency upon ISP's, whose entire existence is based upon the Economy, the Consumer, and a Volatile Market. This actually means, an ISP has no guaranteed Future, regarding either the use of the IP Address Base, or their Routers for a thoroughfare. In other words, while this RFC did mention some good points, which are indeed supported in the IPTX Specification. It nevertheless, maintained more the soundings of a White Paper Solicitation for a New System Overall, than an actual presentation representing 'CIDR' Architecture. Needless to say, some of the problems discussed, and emphasized repeatedly, addressed the need for a Internet Hierarchy, while dismissing the need to expand the number of Backbone connections, which is the main point of consideration when addressing the concept of an Internet Hierarchy.

RFC 1519 (While this RFC should be the replacement for RFC 1517, because it is clearly derived from RFC 1517, it claims to Obsoletes RFC 1338, which I have not read. And while this paper also disputes some of the proposals outlined in RFC 1518 {Noting Specifically the causes for a loss of aggregation efficiency; Organizations, which are multi-homed, and Organizations, which change, service provider but do not renumber.}. Nevertheless, one thing this RFC does, that the others so far do not, is that, it Mathematically Introduces the beginnings of Foundation for the 'CIDR' Architecture.)

Argument in Opposition (Justification of the New 'CIDR' Architecture):

Nonetheless, while this RFC introduces the basic Mathematical Foundation for the 'CIDR' Architecture, and sets the fundamentals for the hardware and software specifications for Networking in a Supernetted Environment, it actually does nothing to prevent IP Address wasted on Host Assignments. This is because the foundation of the 'CIDR' Architecture was derived from the IPv4 specification, which means there was no way, short of a New IP Addressing System, could this waste be avoided. However, this is not the problem with the IPT1 specification, because it De-Emphasizes the HOST IP Address, and gives it secondary functional value, which defines a dummy Host. Needless to say, this was the foundation that was needed to get the 'Ball Rolling'. Nevertheless, while RFC 1519 developed the Mathematical foundation for the 'CIDR' Architecture, it never fully Exploited the benefits this Architecture maintains.

Definitions

CIDR: Classless Inter-Domain Routing is an IP Address Resolution Technique that provides a way to resolve any Binary Number(s) into it's the Integer Translation to verify an IP Address, which is written in 'Dotted Notation', and defined by ' 4 ' 8 Bit Octets.

CIDR Network Descriptor: It is a 2 Part Number used to resolve, or discover the Integer representing the Binary Number defining the Network Address IP Bit-Mapped.

[Where by, the Digits to the Right of the Colon Represents the Starting Point for the IP Address Class Range in Binary Notation, or Network IP Address assigned to the Specified IP Address Class Range. And the Digits to the Left of the Colon represent the Count of Bit Mapped Displacement, or the Number of Binary Digits the Network IP Address uses. In which case, the '/XXXX:XX' notation would be used to Identify the Bit-Mapped Address Class and the Address Class Range of a Network IP Address.]

Nevertheless, the definitions noted above, concludes the argument by providing logical support for Re-Defining the 'CIDR' notation as the "Network Descriptor", which comprises a Switch, and a 2-part Number that defines the entire Range of every IP Address, including the Address Class Range mapping every Octet for the Network portion of the IP Address defines.

TABLE II

IPtX - Internet Protocol t1 Address Space INDEX

IPaddNum = Network IP Address (XXX.XXX.XXX.XXX)

CIDRNetDescrip = CIDR Network Descriptor (/XXXX:XX)

CIDRNetDesSwitch = CIDR Network Descriptor Switch (/)

CIDRNetDesClassID = A "4" place Binary Number (XXXX)
Identifying the 'Front-End' of the
Bit-Mapped Space of the Network Address
in the Range of the Address Class.

CIDRNetDesDivider = Statement End-Start New Statement (:)

CIDROctDesNetID = A "2" place, or variable Number (XX)
Identifying the entire Bit-Mapped Range
of an IP Address. (IPv6 has "3" places)

ZONEIPaddNum = Zone IP designates the Continent's location,
and it is the First of a 2 Octet configuration
defining the Prefix of a 32 Bit IP Address,
which is 8 Bit Number Terminated by a Colon (XXX:)

IPAreaCodeaddNum = IP Area Code designates the second level
of the Continent's Sub-Region, and defines
the Second of the 2 8 Bit Octet configuration
Prefixing a 32 Bit IP Address that is also
Terminated by a Colon (XXX:)

GlobalIPaddNum = GlobalNet IP Address (XXX:XXX:XXX.XXX.XXX.XXX)

CIDRTrunkNetID = The combined use of the 'Zone IP' and the
'IP Area Code' to identify the "Trunk-Identifier",
which is assigned to the 'TelCo-Xchge or Backbone Routers'

3. The IPtX and IPv4 IP Addressing Schemes –100% Compatibility

The IPtX IP Addressing Scheme is a logically derived 'Internet Protocol Addressing Family' that is founded upon the IPv4 IP Addressing Specification. In other words, because IPtX utilizes the same Bit-Mapped Binary Addressing Format, which does not require any deviation from the operational infrastructure of the IPv4 Address Space. It maintains a 100% Backward Compatibility with IPv4, which is retained throughout an expansion capability defining an Infinitely Bit-Mapped IP Address Space using only a 64 Bit Header. There is however, the one noted difference in the IPv4 and the IPtX Specifications, which defines a distinction between the respective "Subnet-Mask" and the "Subnet-Identifier" that allows the IPtX Address Pool to be greater than IPv4 and IPv6, when using the same Bit-Mapped IP Address Space. Needless to say, while this distinction might at first, appear to be a strong departure from the IPv4 Format. It's only a 'Binary Switch' that uses the elements from the Set, {X,Y} to provide the ability the Change ((between) or (Extend)) the 'Programmed Functions' or 'Operations' defining the "Subnet-Mask" and the "Subnet-Identifier". In any case, it should be clearly understood, the definition of the "Subnet-Identifier" extends the definition of the "Subnet-Mask" by providing the ability to Change the Range of the Subnet, which specifies the range of the Host IP Address. And this, it should be noted, is the Distinguishing Mathematical Hallmark that assigns every IP Address in the IPv4 Specification to the IP Address Pool, with the added benefit of the creation of a Host IP Address Pool. Now, if the Address Spaces were equal, the number of available IP Address in the IP Address Pool assigned to the IPv4 Specification, given that IPtX is defined as the extension of IPv4, exceeds the number of available IP Address in the IP Address Pool assigned to the IPv6 Specification. Nevertheless, the validity of the forgoing is supported by the conclusions from the mathematical analysis and comparison of Tables III, IV, and V.

TABLE III

Structure Decimal of the IPv4 Representation IP Class System
IPv4 IP Address Pool = 4.145×10^9 Addresses

- 1. Class A: 1 - 126, Default Subnet Mask 255.X.X.X:
126 Networks and 16,387,064 Hosts: 0000**
- 2. Class B: 128- 191, Default Subnet Mask 255.255.X.X:
16,256 Networks and 64,516 Hosts: 1000**
- 3. Class C: 192 - 223, Default Subnet Mask 255.255.255.X:
2,064,512 Networks and 254 Hosts: 1100**
- 4. Class D: 224 - 239; Used for Multicasting, No Host: 1110
 $16 \times 254^3 = 262,192,024$ IP Addresses available**
- 5. Class E: 240 - 254; Denoting Experimental, No Host: 1111
 $15 \times 254^3 = 245,805,960$ IP Addresses available**

TABLE IV

**IPtX - 'Subnet-Identifier' = "Subnet-Mask" - 100% Backward Compatibility with IPv4
"IPtX Addressing System Using the Current Binary System."**

[Note: The Law of the Octet defines the value, relative to Class, of the 'Y' variable in the IP Address Pool containing; $4,145,927,192 = 4.145 \times 10^9$ Addresses, which should be: $2^{32} = 4,294,967,296$]

1. Total IP Addresses for Class A = $126 \times 254^3 = 2,064,770,064$

Total available IP Host Addresses Equals 126×254^N

[Where N = Number of Octet(s), and 'Y' equals the Address Range '128 - 254', 1 - 126 is not included in the Address Range Represented by the equation 'Y = 254 - 126'.]

Class A-1, 1 - 126, Default Subnet-Mask 255.Y.X.X:
126 Networks and 8,129,016 Hosts: /0000:08

Class A-2, 1 - 126, Default Subnet-Mask 255.255.Y.X:
15,876 Networks and 32,004 Hosts: /0000:16

Class A-3, 1 - 126, Default Subnet-Mask 255.255.255.Y:
2,000,376 Networks and 126 Hosts: /0000:24

Class A-4, 1 - 126, Default Subnet-Mask 255.255.255.255:
252,047,376 Network / MultiCast IP Addresses / AnyCast: /0000:32

TABLE IV - Continued

- 2. Total IP Addresses for Class B = $64 \times 254^3 = 1,048,772,096$**
Total available IP Host Addresses Equals 64×254^N
[Where N = Number of Octet, and 'Y' equals the Address Range '254 - Q'; 128 - 191 is not included in the Address Range Represented by the equation 'Y = 254 - 64'.]
- Class B-1, 128 - 191, Default Subnet Mask 255.Y.X.X:
64 Networks and 4,129,024 Hosts: /1000:08**
- Class B-2, 128 - 191, Default Subnet Mask 255.255.Y.X:
4,096 Networks and 48,260 Hosts: /1000:16**
- Class B-3, 128 - 191, Default Subnet Mask 255.255.255.Y:
262,144 Networks and 64 Hosts: /1000:24**
- Class B-4, 128 - 191, Default Subnet Mask 255.255.255.255:
16,777,216 Network / MultiCast IP Addresses / AnyCast: /1000:32**
- 3. Total IP Addresses for Class C = $32 \times 254^3 = 524,386,048$**
Total available IP Host Addresses Equals 32×254^N
[Where N = Number of Octet, and 'Y' equals the Address Range '254 - Q'; 192 - 223 is not included in the Address Range Represented by the equation 'Y = 254 - 32'.]
- Class C-1, 192 - 223, Default Subnet Mask 255.Y.X.X:
32 Networks and 2,065,512 Hosts: /1100:08**
- Class C-2, 192 - 223, Default Subnet Mask 255.255.Y.X:
1,024 Networks and 8,128 Hosts: /1100:16**
- Class C-3, 192 - 223, Default Subnet Mask 255.255.255.Y:
32,768 Networks and 32 Hosts: /1100:24**
- Class C-4, 192 - 223, Default Subnet Mask 255.255.255.255:
1,048,576 Network / MultiCast IP Addresses / AnyCast: /1100:32**

TABLE IV - Continued

4. Total IP Addresses for Class D = $16 \times 254^3 = 262,193,024$

Total available IP Host Addresses Equals 16×254^N

[Where N = Number of Octet, and 'Y' equals the Address Range '254 - Q'; 224 - 239 is not included in the Address Range Represented by the equation 'Y = 254 - 16'.]

**Class D-1, 224 - 239, Default Subnet Mask 255.Y.X.X:
16 Networks and 1,032,256 Hosts: /1110:08**

**Class D-2, 224 - 239, Default Subnet Mask 255.255.Y.X:
256 Networks and 3,048 Hosts: /1110:16**

**Class D-3, 224 - 239, Default Subnet Mask 255.255.255.Y:
4,096 Networks and 16 Hosts: /1110:24**

**Class D-4, 224 - 239, Default Subnet Mask 255.255.255.255:
65,536 Network / MultiCast IP Addresses / AnyCast: /1110:32**

5. Total IP Addresses for Class E = $15 \times 254^3 = 245,805,960$

Total available IP Host Addresses Equals 15×254^N

[Where N = Number of Octet, and 'Y' equals the Address Range '254 - Q'; 240 - 254 is not included in the Address Range Represented by the equation 'Y = 254 - 15'.]

**Class E-1, 240 - 254, Default Subnet Mask 255.Y.X.X:
15 Networks and 967,740 Hosts: /1111:08**

**Class E-2, 240 - 254, Default Subnet Mask 255.255.Y.X:
225 Networks and 3,810 Hosts: /1111:16**

**Class E-3, 240 - 254, Default Subnet Mask 255.255.255.Y:
3,375 Networks and 15 Hosts: /1111:24**

**Class E-4, 240 - 254, Default Subnet Mask 255.255.255.255:
50,625 Network / MultiCast IP Addresses / AnyCast: /1111:32**

The mathematical analysis of the result from Table III and Table IV reveals that when the "Subnet-Mask" is equal to the "Subnet-Identifier". The division of the Address Classes in the IPv4 Specification, is defined by the "Network Descriptor" as; the Logical Expansion of each of the Address Classes in the IPv4 Specification, through the use of the Network ID designation, "255", in remaining Octets. And because the requirement of the "Subnet-Mask" mandates that 'only a Number from the Range of the Address Class' can be assigned a Network ID, then every Octet specifies one of the '4 Sub-Division' created in the Range of every Address Class. In other words, because the "Subnet-Mask" specifies the uses of the "255" designation in conjunction with the 'Range of the Address Class', to identify the Address Class associated with the Network ID. The logical use of the Octets remaining in the Range of every Address Class in conjunction with the "Subnet-Mask", is the logical consequence of the conclusion derived from the expansion, or sub-division of the 'Address Class Range' that was outlined in RFC 1517, 1518, and 1519. Needless to say, since 'the Quantified Sum of the 'Product of the Network and Host IP Addresses' for every Address Class in Table IV, is equal to the Total Number of IP Address assigned to the Range of the Address Class defined by Table III, then the Addressing Specifications shown by these Tables are mathematically equal. In which case, mathematically speaking, it should be concluded that the IPtX Specification, by RFC 1517, 1518, and 1519, is the interpretation of the IPv4 Specification derived from the use of the "Subnet-Mask".

4. The Structural Comparison - IPv6 vs. IPTX

The handicaps from using an askew Binary System, the Loop-Back Address (127), and the Subnet-Mask (255), makes it impossible for the IPv4 Specification, even through the progressive expansion using 32 Bit additions for an equal Address Space, to match the IP Addresses available in the IP Address Pool of the IPv6 Specification. And clearly, the same fate, according to Figures 1 and 2, will befall the IPTX Specification. However, because the IPTX Specification maintains an expansion capability that defines an Infinitely Bit-Mapped IP Address Space, using only a 64 Bit Header. In which, the 'TelCo-Xchge or Backbone Routers' would be assigned a Network ID, which would absorb the Bit-String of the Address Space beyond the 32 Bit-Mapped IP Address Space defined by the IPT1 Specification. And since, the losses represented by Figures 1 and 2, at infinity, are not discernable. The IPTX Specification maintains an IP Address Pool Capacity, which is theoretically, infinitely larger than the IP Address Pool availability in the IPv6 Specification (See Figure 3).

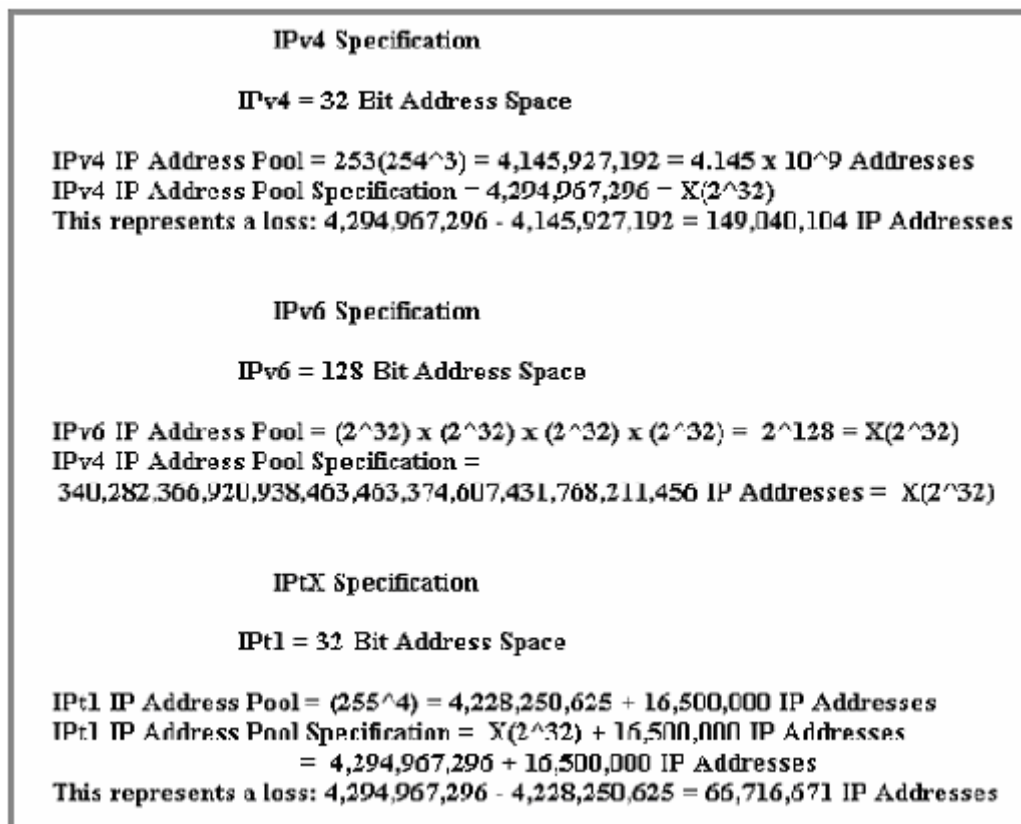


Figure 1

IPtX Specification

IPt2 = 64 Bit Address Space

$$\begin{aligned}\text{IPt2 = 48 Bit IP Address} &= (255^2)(255^4) = X(2^{32}) + 16,500,000 \text{ IP Addresses} \\ \text{IPt2 IP Address Pool} &= (255^2)(255^4) = 65,025 X(2^{32}) + 16,500,000 \text{ IP Addresses} \\ &= 65,025(4,228,250,625) + 16,500,000 \\ &= 2.7494200 \times 10^{14} + 16,500,000 \text{ IP Addresses}\end{aligned}$$

$$\begin{aligned}\text{IPt2 IP Address Pool Specification} &= X(2^{32}) + 16,500,000 \text{ IP Addresses} \\ &= (256^2)(2^{32}) = 2.8147498 \times 10^{14}\end{aligned}$$

$$\begin{aligned}\text{This represents a loss: } &2.8147498 \times 10^{14} - 2.7494200 \times 10^{14} \\ &= 6.5329799 \times 10^{12} \text{ IP Addresses}\end{aligned}$$

$$\begin{aligned}\text{IPt2 = 64 Bit IP Address} &= (255^4)(255^4) = X(2^{32}) + 16,500,000 \text{ IP Addresses} \\ \text{IPt2 IP Address Pool} &= (255^8) = 1.7878103 \times 10^{19} + 16,500,000 \text{ IP Addresses} \\ &= 1.7878103 \times 10^{19} + 16,500,000 \\ &= 1.7878103 \times 10^{19} + 16,500,000 \text{ IP Addresses}\end{aligned}$$

$$\begin{aligned}\text{IPt2 IP Address Pool Specification} &= (256^4)(2^{32}) = 1.8446744 \times 10^{19} \\ &= X(2^{32}) + 16,500,000 \text{ IP Addresses}\end{aligned}$$

$$\begin{aligned}\text{This represents a loss: } &1.8446744 \times 10^{19} - 1.7878103 \times 10^{19} \\ &= 5.6864072 \times 10^{17} \text{ IP Addresses}\end{aligned}$$

Figure 2

'IPtX IP Specification' (Topology of the Internet Backbone Hierarchy)										
"Trunk-Identifier" Address Size Spec.		Zone IP and IP Area Code Address Spec.		IP Addressing Spec.		IP Header BITS Size Spec.		Bit-Mapped IP Address Space Spec.		Network IP Address Size Spec.
None	=	None	=	IPt1	=	32 Bit	=	32 Bit	=	32 Bit
32 Bit	=	16 Bit	=	IPt2	=	64 Bit	=	64 Bit	=	32 Bit
64 Bit	=	16 Bit	=	IPt3	=	64 Bit	=	96 Bit	=	32 Bit
96 Bit	=	16 Bit	=	IPt4	=	64 Bit	=	128 Bit	=	32 Bit
128 Bit	=	16 Bit	=	IPt5	=	64 Bit	=	160 Bit	=	32 Bit
:		:		:		:		:		:
3.168k Bit	=	16 Bit	=	IPt100	=	64 Bit	=	3,200 Bit	=	32 Bit
:		:		:		:		:		:
159,968 Bit	=	16 Bit	=	IPt5000	=	64 Bit	=	160,000 Bit	=	32 Bit
:		:		:		:		:		:
Infinity	=	16 Bit	=	IPtX	=	64 Bit	=	Infinity	=	32 Bit

The "Trunk-Identifier" Specification (Spec.) contains the Zone IP and IP Area Code. And given that Software can assign the Zone IP and IP Area Code to any location/destination. Eventually it will be necessary to know an 18 Digit IP Address: ZoneIP, IPAreaCode, Network IP Address.

Figure 3

INTERNET PROTOCOL t2 (64 Bit) ADDRESS SPACE						
IPt2 IP Address Prefix			IPt1 Address /Schematic\		Distribution /Purpose\	Date / \
Reserved BITS / \	CIDR Network Descriptor	Zone IP V	IP Area Code	IP Address Assignment		
					V	V
8 8	None	000:	000:	000.000.000.000	None	4/2002
8 8	All	001:	All:	XXX.XXX.XXX.XXX	NA	4/2002
8 8	All	002:	All:	XXX.XXX.XXX.XXX	SA	4/2002
8 8	All	003:	All:	XXX.XXX.XXX.XXX	EU	4/2002
8 8	All	004:	All:	XXX.XXX.XXX.XXX	OS	4/2002
8 8	All	005:	All:	XXX.XXX.XXX.XXX	AU	4/2002
8 8	All	006:	All:	XXX.XXX.XXX.XXX	AF	4/2002
8 8	All	007-256:	All:	XXX.XXX.XXX.XXX	IANA/RESERVED	4/2002
8 8	All	001-256:	000-256:	000.000.000.000	IANA/EMERGENCY	4/2002
8 8 ±	0000:00 256:	256:	256:	127.000.000.000	IANA/LoopBack	4/2002

Note: SA = South American, NA = North America, EU = European Union, AU = African Union, OS = Oceania States, AF = Asian Federation.

Figure 4

Note: While noting that any Trunk-Id beyond 96 Bits might seem ridiculous, because of the inherent limitations of the design specifications for the "Network Descriptor", (+/0000:00). However, assigning a 'Router-ID' that requires Special Authentication between communicating Routers could easily absorb any Number of Bits beyond the IPt4 Specification.

Nevertheless, it should be clearly understood, that if the 'TelCo-Xchge or Backbone Routers' were assigned the "Trunk-Identifier", then there must be a way to verify, resolve, or confirm the "Zone IP and the IP Area Code" Address defining the "Trunk-Identifier". In other words, the IPtX Specification can maintain the "Subnet-Identifier", use the "Network Descriptor" to verify the "Trunk-Identifier", and exhaust, without loss, every available IP Address in the Address Pool defined by the equation 1 (eq-1):

$$\text{eq-1: } \text{IPtX} = X(2^{32}) + 16,900,000 = \infty$$

$$\text{eq-2: } \text{IPv6} = X(2^{32}) = (2^{128}) = (256^{16}) = 3.4028237 \times 10^{38}$$

The process of maximizing the Address Pool defined by equation 1, is a '3' Step procedure, in which the first step exhaust all of the available IP Addresses in the IPv4 Specification. The second step requires changing the Symbol used as the "Network Designator" for the "Subnet-Identifier" (255 or 256), and the third step requires expanding the function of the Switch for the "Network Descriptor". To achieve the first goal, multiply the Network and Host IP Addresses from Table IV, and use the product to represent the total number of Networks, leaving the Host total unchanged. And after the "Network Descriptor" and the "Subnet-Identifier" has been redefined, as provided in Table V. The adjusted results now reveals that the total number of available IP Addresses in the Address Pool for the IPtX Specification is equal the equation 1, and it exceeds the amount assigned to the IPv6 Specification, when the size of the Bit-Mapped Address Space is equal to both Addressing Specifications (See Table VI).

TABLE V - Definitions

"Network Descriptor": A method derived from the CIDR notation, which is used to resolve and identify every part of a Network IP Address. And when it defines the use of '2' State Switch, comprising a 'Statement End-Start' New Statement Command symbol' and a 2 Part numeral, it separates an IP Address into 2 components, which identifies the Network IP Address and the Trunk-Identifier.

CIDR Network Descriptor ' ±/0000:00 '

- 1) '2' State Switch: " ±/ " - CIDRNetDesSwitch
 - a) "Network-Identifier" Switch: '-/' - CIDRGetIPAddNum
 - b) "Trunk-Identifier" Switch: '+/' - CIDRTrunkIDNum
- 2) 'End-Start', Flip/Flop Command symbol: '(:) ' - CIDRGetTrunkIDNum
- 3) 'Network ID': ' 0000 ' - CIDRNetDesClassID
- 4) 'Octet Bit-Map': ' 00 ' - CIDROctDesNetID - Address Length

"Subnet-Identifier": Defines the OverLay that is used in conjunction with a "Network Designator" and the 'X' and 'Y' variables to resolve a Networks IP Address.

- 1) "Network Designator": The symbol for the Null Set, ' Ø ', which is used as the 'Place Holder-', identifying the OCTET(s) that define the Network ID, or the Network portion of the 32 Bit IP Address.
- 2) "Octet using eiture Address Range: ' X '
- 3) "Octet not using "Network Designator" Addresses: ' Y '

Note: From Table V, the "Network Designator", which is symbolized as; ' Ø ', could just as easily, been assigned to defined any symbol, (e.g.; '257') except for ' 0 '(representing ' 00 ', the Binary equivalent of ' 1 ') and any assignment represented in the Range of the Addressing Specification. In any case, it should be clearly understood that when every available IP Address is used for IP Addressing. The IPtX Addressing Schematic, (where fig. 5 and fig. 6 respectively denotes IPt1 and IPt2 Specifications) becomes nothing more than an OVERLAY, which is used to facilitate the visualization of the Topology for the Structure of the Network Design. And this is an extremely important advantage when designing a Network containing hundreds (or thousands) of Servers and several thousand (or Million) Hosts assigned to Subnets. [It is important to note, ' Ø ' represents the **NULL SET** or **TRUE ZERO** {the Traditional European Representation for True Zero}, and ' 0 ' is EQUAL to ' 00 ', which defines the Binary equivalence of ' 1 ': ' 00 ' = ' 0 ' = ' 1 ' .]

TABLE VI : ' IPv4 ' 128 Bit-Mapped Space

"The Logically derived Structure of the 'Synthetic' Decimal Representation of the IPv4 IP Addressing Specification"

IPv4 Address Pool Size = $2^{32}(256^{12}) = 256^{16}$
= 4,294,967,296(256^{12}) = 3.4028237×10^{38}

NOTE: IPv4, by FIGURE '5' contains;
' 7.9228163×10^{28} ' COPIES of the 'IPv4' Specification

CLASS A - 'Address Range 1 - 128'

A-1; Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.Y.X.X ±/0000:08

- Networks: $128 \times (128 \times 256^2)(256^{12})$

- Host: $128 \times 256^2 = 8,388,608$

A-2; Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.Y.X ±/0000:16

- Networks: $(128^2)(128 \times 256)(256^{12})$

- Host: $128 \times 256 = 32,768$

A-3; Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.000.Y ±/0000:24

- Networks: $(128^3) \times 128(256^{12})$

- Host: 128 = 128

A-4; Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.000.000 ±/0000:32

- Networks: $128^4(256^{12})$

- Host: 0

Total Number of Available Network and Host Addresses:

Networks ID - $2^7 = (256^{12})(128 \times 16,777,216)$

= 1.7014118×10^{38}

Hosts = $(128 \times 256^2) + (128 \times 256) + 128 = 8.421.504$

TABLE VI : ' IPv4 ' 128 Bit-Mapped Space - Continued

CLASS B - 'Address Range 129 - 192'

B-1, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.Y.X.X ±/1000:08

- Networks: $64(256 - 64)(256^2)(256^{12})$

- Host: $64 \times 256^2 = 4,194,304$

B-2, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.Y.X ±/1000:16

- Networks: $(64^2)(256 - 64) \times 256(256^{12})$

- Host: $64 \times 256 = 16,384$

B-3, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.000.Y ±/1000:24

- Networks: $64^4(256^{12})$

- Host: 64 = 64

B-4, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:256:000.000.000.000 ±/1000:32

- Networks: (256^{12})

- Host: 0

Total Number of Available Network and Host Addresses:

Networks ID - $2^6 = (256^{12})(64 \times 16,777,216)$

= 8.5070592×10^{37}

Hosts = $(64 \times 256^2) + (64 \times 256) + 64 = 4,210,752$

TABLE VI: 'IPt4' 128 Bit-Mapped Space - Continued

CLASS C - 'Address Range 193 - 224'

- C-1, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.Y.X.X \neq /1000:08
- Networks: $32(256 - 32)(256^2)(256^{12})$
- Host: $32 \times 256^2 = 2,097,152$
- C-2, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.Y.X \neq /1000:16
- Networks: $32^2(256 - 32) \times 256(256^{12})$
- Host: $32 \times 256 = 5,888$
- C-3, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.000.Y \neq /1000:24
- Networks: $32^3(256 - 32)(256^{12})$
- Host: $32 = 32$
- C-4, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.000.000 \neq /1000:32
- Networks: $32^4(256^{12})$
- Host: 0

Total Number of Available Network and Host Addresses:
Networks ID - $2^5 = (256^{12})(32 \times 16,777,216)$
 $= 4.2535296 \times 10^{37}$
Hosts = $(32 \times 256^2) + (32 \times 256) + 32 = 2,105,376$

TABLE VI: 'IPt4' 128 Bit-Mapped Space - Continued

CLASS D - 'Address Range 225 - 240'

- D-1, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.Y.X.X \neq /1000:08
- Networks: $16(256 - 16)(256^2)(256^{12})$
- Host: $16 \times 256^2 = 1,048,576$
- D-2, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.Y.X \neq /1000:16
- Networks: $16^2(256 - 16) \times 256(256^{12})$
- Host: $16 \times 256 = 4,096$
- D-3, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.000.Y \neq /1000:24
- Networks: $16^3(256 - 16)(256^{12})$
- Host: $16 = 16$
- D-4, Subnet Id - 256:256:256:256:256:256:256:256:256:256:256:000.000.000.000 \neq /1000:32
- Networks: $16^4(256^{12})$
- Host: 0

Total Number of Available Network and Host Addresses:
Networks ID - $2^4 = (256^{12})(16 \times 16,777,216)$
 $= 2.1267648 \times 10^{37}$
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

TABLE VI: 'IPt4' 128 Bit-Mapped Space - Continued

CLASS E - 'Address Range 241 - 256'

E-1, Subnet Id - 256:256:256:256:256:256:256:256:256:256:000.YXX ±/1000:08
- Networks: $16(256 - 16)(256^{12})$
- Host: $16 \times 256^2 = 1,048,576$
E-2, Subnet Id - 256:256:256:256:256:256:256:256:256:256:000.000.YX ±/1000:16
- Networks: $16^2(256 - 16) \times 256(256^{12})$
- Host: $16 \times 256 = 4,096$
E-3, Subnet Id - 256:256:256:256:256:256:256:256:256:256:000.000.000.Y ±/1000:24
- Networks: $16^3(256 - 16)(256^{12})$
- Host: $16 = 16$
E-4, Subnet Id - 256:256:256:256:256:256:256:256:256:256:000.000.000.000 ±/1000:32
- Networks: $16^4(256^{12})$
- Host: 0
Total Number of Available Network and Host Addresses:
Networks ID - $2^4 = (256^{12})(16 \times 16,777,216)$
= 2.1267648×10^{37}
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

Note: Since, the "Subnet Id" = the "Subnet Identifier", the Shared Host IP Address Pool increases by a factor equal the number of available Network IP addresses assigned to every sub-division within the Overlay defining the Address Class Range, given that No Host Address is assigned a direct Internet Connection.

$$\text{eq-1: } \text{IPtX} = X(2^{32}) + 16,900,000 = \infty$$

$$\text{eq-2: } \text{IPv6} = X(2^{32}) = (2^{128}) = (256^{16}) = 3.4028237 \times 10^{38}$$

$$\begin{aligned} \text{eq-3: } \text{IPt4} &= X(2^{32}) + 16,900,000 \\ &= (2^{128}) + 16,900,000 \\ &= (256^{16}) + 16,900,000 \\ &= 3.4028237 \times 10^{38} + 16,900,000 \text{ Host Addresses} \end{aligned}$$

$$\text{eq-4: } \text{IPv4} = X(2^{32}); \text{ when } X = 1.$$

FIGURE 5 : 'IPt1'

"The Logically derived Structure of the 'Synthetic' Decimal Representation of the IPt1 IP Addressing Specification"

**'IPt1' Address Pool Size = $2^{32} = 256^4$
= 4,294,967,296 = 4.294967296×10^9**

CLASS A

I. A-1, 1 - 128, Subnet Identifier $000.Y.X.X$ -/0000:08
- Networks: $128 \times (128 \times 256^2)$
- Host: 128×256^2

A-2, 1 - 128, Subnet Identifier $000.000.Y.X$ -/0000:16
- Networks: $(128^2)(128 \times 256)$
- Host: 128×256

A-3, 1 - 128, Subnet Identifier $000.000.000.Y$ -/0000:24
- Networks: $(128^3) \times 128$
- Host: 128

A-4, 1 - 128, Subnet Identifier $000.000.000.000$ -/0000:32
- Networks: 128^4
- Host: 0

Total Number of Available Network and Host Addresses:

2^7 Networks = $128 \times 16,777,216 = 2,147,483,648$

Hosts = $(128 \times 256^2) + (128 \times 256) + 128 = 8,421,504$

FIGURE 5 : 'IPt1' - Continued

CLASS B

2. B-1, 129 - 192, Subnet Identifier $000.Y.X.X$ -/1000:08

- Networks: $64(256 - 64)(256^2)$

- Host: 64×256^2

B-2, 129 - 192, Subnet Identifier $000.000.Y.X$ -/1000:16

- Networks: $(64^2)(256 - 64) \times 256$

- Host: 64×256

B-3, 129 - 192, Subnet Identifier $000.000.000.Y$ -/1000:24

- Networks: $64^3 (256 - 64)$

- Host: 64

B-4, 129 - 192, Subnet Identifier $000.000.000.000$ -/1000:32

- Networks: 64^4

- Host: 0

Total Number of Available Network and Host Addresses:

2^6 Networks = $64 \times 16,777,216 = 1,073,741,824$

Hosts = $(64 \times 256^2) + (64 \times 256) + 64 = 4,210,752$

FIGURE 5 : 'IPt1' - Continued

CLASS C

3. C-1, 193 - 224, Subnet Identifier 000.Y.X.X -/1000:08
- Networks: $32(256 - 32)(256^2)$
- Host: 32×256^2
- C-2, 193 - 224, Subnet Identifier 000.000.Y.X -/1000:16
- Networks: $32^2(256 - 32) \times 256$
- Host: 32×256
- C-3, 193 - 224, Subnet Identifier 000.000.000.Y -/1000:24
- Networks: $32^3(256 - 32)$
- Host: 32
- C-4, 193 - 224, Subnet Identifier 000.000.000.000 -/1000:32
- Networks: 32^4
- Host: 0
- Total Number of Available Network and Host Addresses:
 2^5 Networks = $32 \times 16,777,216 = 536,870,912$
Hosts = $(32 \times 256^2) + (32 \times 256) + 32 = 2,105,376$

FIGURE 5 : 'IPt1' - Continued

CLASS D

4. D-1, 225 - 240, Subnet Identifier 000.Y.X.X -/1000:08
- Networks: $16(256 - 16)(256^2)$
- Host: 16×256^2
- D-2, 225 - 240, Subnet Identifier 000.000.Y.X -/1000:16
- Networks: $16^2(256 - 16) \times 256$
- Host: 16×256
- D-3, 225 - 240, Subnet Identifier 000.000.000.Y -/1000:24
- Networks: $16^3(256 - 16)$
- Host: 16
- D-4, 225 - 240, Subnet Identifier 000.000.000.000 -/1000:32
- Networks: 16^4
- Host: 0
- Total Number of Available Network and Host Addresses:
 2^4 Networks = $16 \times 16,777,216 = 268,435,456$
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

FIGURE 5 : 'IPt1' - Continued

CLASS E

3. E-1, 241 - 256, Subnet Identifier $000.Y.X.X$ -/1000:08
- Networks: $16(256 - 16)(256^2)$
- Host: 16×256^2

E-2, 241 - 256, Subnet Identifier $000.000.Y.X$ -/1000:16
- Networks: $16^2(256 - 16) \times 256$
- Host: 16×256

E-3, 241 - 256, Subnet Identifier $000.000.000.Y$ -/1000:24
- Networks: $16^3(256 - 16)$
- Host: 16

E-4, 241 - 256, Subnet Identifier $000.000.000.000$ -/1000:32
- Networks: 16^4
- Host: 0

Total Number of Available Network and Host Addresses:
 2^4 Networks = $16 \times 16,777,216 = 268,435,456$
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

Special Note: The simplification of the Network IP Addressing format into the 'Zone IP', the 'IP Area Code', and the 'Network IP Address', as provided by the IPtX Specification, could also REPLACE the format currently being used by the Telephone Systems all over the World. In other words, there is an EASY, 'Off-The-Shelf' procedure for DIALING any Telephone Number defined by the 18 Digit String from the 'IPtX' Specification:

1. Dial First - Key in the digits representing the 'ZONE IP'
2. Dial Next - Key in an Asterisk " * " for the 'End-Start New Statement' '(:)'
3. Dial Second - Key in the digits representing the 'IP AREA CODE'
4. Dial Next - Key in an Asterisk " * " for the 'End-Start New Statement' '(:)'
5. Dial Third - Key in the All '12' digits representing the 'NETWORK IP ADDRESS'

e.g. Dialing; '123:213:121.0.12.3' = '123 * 213 * 121-000-012-003';
Where it is not possible to define the Zone IP, IP Area Code, or Network IP Address with ' 0 '.

FIGURE 6 : 'IPt2'

"The Logically derived Structure of the 'Synthetic' Decimal Representation of the IPt2 IP Addressing Specification"

'IPt2' Address Pool Size = $2^{32}(256^2) = 256^6$
= $4,294,967,296(256^2) = 2.814798 \times 10^{14}$

NOTE: IPt2, by FIGURE '5' contains;
' 256^2 ' COPIES of the 'IPt1' Specification

CLASS A

1. A-1, 1 - 128, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

$\emptyset\emptyset\emptyset.Y.X.X \pm/0000:08$

- Networks: $128 \times (128 \times 256^2)(256^2)$

- Host: 128×256^2

A-2, 1 - 128, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

$\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset.Y.X \pm/0000:16$

- Networks: $(128^2)(128 \times 256)(256^2)$

- Host: 128×256

A-3, 1 - 128, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

$\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset.Y \pm/0000:24$

- Networks: $(128^3) \times 128(256^2)$

- Host: 128

A-4, 1 - 128, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

$\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset.\emptyset\emptyset\emptyset \pm/0000:32$

- Networks: $128^4(256^2)$

- Host: 0

Total Number of Available Network and Host Addresses:

Networks $2^7(256^3)(256^2) = (128 \times 16,777,216)(256^2)$

= $2,147,483,648(256^2)$

Hosts = $(128 \times 256^2) + (128 \times 256) + 128 = 8,421,504$

FIGURE 6 : 'IPt2' - Continued

CLASS B

2. B-1, 129 - 192, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

000.Y.X.X ±/1000:08

- Networks: $64(256 - 64)(256^2)(256^2)$

- Host: 64×256^2

B-2, 129 - 192, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

000.000.Y.X ±/1000:16

- Networks: $(64^2)(256 - 64) \times 256(256^2)$

- Host: 64×256

B-3, 129 - 192, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

000.000.000.Y ±/1000:24

- Networks: $64^3(256 - 64)(256^2)$

- Host: 64

B-4, 129 - 192, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:

000.000.000.000 ±/1000:32

- Networks: $64^4(256^2)$

- Host: 0

Total Number of Available Network and Host Addresses:

Networks $2^6(256^3)(256^2) = (64 \times 16,777,216)(256^2)$

$= 1,073,741,824(256^2)$

Hosts = $(64 \times 256^2) + (64 \times 256) + 64 = 4,210,752$

FIGURE 6 : 'IPT2' - Continued

CLASS C

3. C-1, 193 - 224, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.Y.X.X ±/1000:08

- Networks: $32(256 - 32)(256^2)(256^2)$

- Host: 32×256^2

C-2, 193 - 224, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.Y.X ±/1000:16

- Networks: $32^2(256 - 32) \times 256(256^2)$

- Host: 32×256

C-3, 193 - 224, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.Y ±/1000:24

- Networks: $32^3(256 - 32)(256^2)$

- Host: 32

C-4, 193 - 224, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.000 ±/1000:32

- Networks: $32^4(256^2)$

- Host: 0

Total Number of Available Network and Host Addresses:

Networks $2^5(256^3)(256^2) = (32 \times 16,777,216)(256^2)$
 $= 536,870,912(256^2)$

Hosts = $(32 \times 256^2) + (32 \times 256) + 32 = 2,105,376$

FIGURE 6 : 'IPt2' - Continued

CLASS D

4. D-1, 225 - 240, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.Y.X.X ±/1000:08

- Networks: $16(256 - 16)(256^2)(256^2)$

- Host: 16×256^2

D-2, 225 - 240, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.Y.X ±/1000:16

- Networks: $16^2(256 - 16) \times 256(256^2)$

- Host: 16×256

D-3, 225 - 240, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.Y ±/1000:24

- Networks: $16^3(256 - 16)(256^2)$

- Host: 16

D-4, 225 - 240, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.000 ±/1000:32

- Networks: $16^4(256^2)$

- Host: 0

Total Number of Available Network and Host Addresses:
Networks $2^4(256^3)(256^2) = (16 \times 16,777,216)(256^2)$
 $= 268,435,456(256^2)$
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

FIGURE 6 : 'IPt2' - Continued

CLASS E

3. E-1, 241 - 256, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.Y.X.X ±/1000:08
- Networks: $16(256 - 16)(256^2)(256^2)$
- Host: 16×256^2
- E-2, 241 - 256, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.Y.X ±/1000:16
- Networks: $16^2 (256 - 16) \times 256(256^2)$
- Host: 16×256
- E-3, 241 - 256, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.Y ±/1000:24
- Networks: $16^3(256 - 16)(256^2)$
- Host: 16
- E-4, 241 - 256, Subnet Id - 8 Bit Reserved:8 Bit Reserved:256:256:
000.000.000.000 ±/1000:32
- Networks: $16^4(256^2)$
- Host: 0

Total Number of Available Network and Host Addresses:
Networks $2^4(256^3)(256^2) = (16 \times 16,777,216)(256^2)$
 $= 268,435,456(256^2)$
Hosts = $(16 \times 256^2) + (16 \times 256) + 16 = 1,052,688$

Special Note:

In the IPtX Specification any Contiguous String of ZERO(s) is not a mathematically viable IP Address, because the IP Address Pool equation, $X(X^{32})$, defines a sequence of counting by successive additions of '1'. That is, using Zero(s), while not a problem for the IPtX Specification, it is however, a problem for IPv6. In other words, the problems inherent in the IPv6 Specification pertain primarily to the difficulties arising from the 48 Digit Number used to represent the Default format of an IP Address. And while there are Rules which define the use of " :: " as the replacement for the Contiguous ZERO(s) String, because they are not mathematically viable, the problem is exacerbated. Furthermore, since I have not found any documentation that specifically defines how to distinguish between 2 or more Addresses defining a different number of ZERO(s) in the Contiguous String, which might occur in the Start, Middle, or Trailing portion of the Address. Clearly, the " :: " cannot be used as the solution for the size reduction of an IPv6 Address, the replacement for a Contiguous String of ZERO(s), at least, not without the necessary Rule(s) explaining its use. Nevertheless, these inadequacies are further compounded by defining the IP Addressing Format as having a variable length, which may be greater than 128 Bits, and the " :: " as a compressor of the leading and/or trailing zeros, or as the replacement for the multiple 16-bit Zero Groups with a specification that limits its use, number of occurrences, in an address. And this, needless to say, defines the gist of the mathematical failings of every supporting document, including RFC 2373, and more importantly, the reasons the Chinese developed the IPv9 Addressing Specification.

It should have been quite clear from documents expounding the development of the design for the 'IPtX' Specification that the "Network Descriptor" provided the means to identify the "Trunk-Identifier", which defines the IP Address assigned to the 'TelCo-Xchge or Backbone Routers'. In other words, from 'Table V - Definitions', the "Network Descriptor" allows for the resolution of the Trunk-Identifier ID and the resolution of the entire Length of the Network IP Address String. And while the "CIDR" notation was exploited even further during the creation of the IPv6 Specification; because the symbol, '/128 ', specifies the length for the Bit-Mapped IP Address, which defines the size of the 128 Bit-Mapped IPv6 Address Space. The "Network Descriptor" provided the ability to separate, or distinguish between the addresses assigned to the 'TelCo-Xchge or Backbone Routers' and the 'Network IP Address'. And this specified the Length defining the Network IP Address as '32 Bits' in the IPtX Specification, even if the size of its Address Space was equal to or greater than the 128 Bit IPv6 Specification.

Nevertheless, this procedure allows the retention of the more familiar structure defining a Network IP Address, which is similar to the 'Telephone Number' and defined by the IPv4 Specification. And clearly, this mathematically clarifies the interpretation of the IPtX Specification (See Table VII), which is logically derived from IPv4, by proving that the number of available Addresses in its IP Address Pool is greater than the IPv6 Specification. Furthermore, since it was only in the configuration of the Router where "CIDR" was addressed, "CIDR", as with the "Network Descriptor" can be automatic, and remain only as the concerns for the Network Engineer, because its affect lies outside the boundary of the Network Domain. In other words, IPtX is a more powerful and cost effective IP Addressing Specification, which allows the interface of the "Front-End" to mimic or simulate the IPv4 Specification, a 32 Bit-Mapped IP Address, in the Backbone environment of an unlimited size IP Address Space.

IPtX - "Network IP Address" Bit-Mapped Length Specification = 32 Bits		Table VII
IPt2 - "Trunk-Identifier"	= 8 Bit Rsvd:8 Bit Rsvd:256:256: = 16 Bit-Mapped Address String	
"Network Descriptor"	= +/- 0000:16; Range is '00 thru 16'	
IPt4 - "Trunk-Identifier"	= 256:256:256:256:256:256:256:256:256:256: = 96 Bit-Mapped Address String	
"Network Descriptor"	= +/- 0000:96; Range is '00 thru 96'	
Given that the first '0000' String defines the:		
"Trunk-Identifier" : Class Range - A, B, C, D, E - using the '+/ ' Switch		
"Network ID" : Address Class of Network IP Address - A, B, C, D, E - using the '-/ ' Switch		

5. Security Considerations

This document, whose only objective was the deliberation of the final explanation for the IPtX Specification, which resulted from the Mathematics of Quantification, does not directly raise any security issues. Hence, there are no issues that warrant Security Considerations.

6. IANA Considerations

The complete Anatomy of a IPtX Address String**

1. 'Router-ID + Trunk-Identifier + Network IP Address**':

Total Address Length - IANA Specifications

2. 'TelCo-Xchge or Backbone Routers' - Router-ID: 'DNS ZONE'

" ID + Trunk-Identifier + ZONE IP + IP AREA CODE "

Total Segment Address Length - IANA Specifications

3. 'Trunk-Identifier' - ID: 'DNS ZONE - Address Block Specification'

" ID + ZONE IP + IP AREA CODE "

a. - 'ZONE IP' - ID ' - Segment Address Length - IANA Specifications

b. - 'IP AREA CODE - ID ' - Segment Address Length - IANA Specifications

Total Segment Address Length - IANA Specifications

4. 'Network IP Address' - ID: Segment Address Length - IANA Specifications

5. Special IANA Consideration: While Router Authentication may prove vital for Security Considerations. However, Address resolution could be accomplished more easily using a '3 State CIDR Network Descriptor Switch' {0, -1, +1}:

- a) Router-ID: /0000:00 or /0000:00E00; ' 00E 00' = 00^{00 thru 99}
{ e.g. 96E99 = 96⁹⁹ Bits; or, $X^{99}(2^{32}) \approx (7.9228163 \times 10^{28})^{99}$ copies of 'IPt1' }
- b) Trunk-Identifier: +/0000:00 or +/0000:00E00; ' 00E 00' = 00^{00 thru 99}
{ e.g. 32E10 = 32¹⁰ Bits; or, $X^{10}(2^{32} \approx (4,294,967,296)^{10}$ copies of 'IPt1' }
- c) Network IP Address: -/0000:00

d) 'ANSI Trace Switch': ±//0000:00 and //0000:00

Work(s) in Progress;

These drafts represent the twelve chapters of the Networking Bible, designing a Network IP Addressing Specification that maintains a 100 Percent backward compatibility with the IPv4 Specification. In other words, this is a design specification developed from the Theory of the Expansion of the IPv4 IP Addressing Specification, which allowed the representation of the Network for the entire World on paper, and the possibility of an Infinite IP Address Pool. Nevertheless, the Internet-Drafts listed below, "Cited as Work(s) in Progress", explain the design Specification for the development of the IPTX (IP Telecommunications Specification) Protocol Addressing System and the correction of the Mathematical Error in the Binary System.

Computer Science / Internet Technology:

<http://www.ietf.org/internet-drafts/draft-terrell-logic-analy-bin-ip-spec-ipv7-ipv8-10.txt>

(Foundational Theory for the New IPTX family IP Addressing Specification, and the Binary Enumeration error discovery after the correction.) - "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-simple-proof-support-logic-analy-bin-02.txt>

(The 2nd proof for the existence of another Binary System, resulting from the Error Correction.)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-visual-change-redefining-role-ipv6-01.pdf>

(Argument against the Machine dependant IPv6 deployment.)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-schem-desgn-ipt1-ipt2-cmput-tel-numb-02.pdf>

(The foundation of the New IPTX Addressing Spec compared to the Telephone Numbering System.)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-internet-protocol-t1-t2-ad-sp-06.pdf>

(The IPTX Addressing Specification Address Space / IP Address Allocation Table; establishes the visual perspective that actually represents Networking Schematic Networking the entire World on Paper.) - "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-iptx-spec-def-cidr-ach-net-descrip-01.pdf>

(Re-Defines CIDR) {Classes Inter-Domain Routing Architecture} and introduces the Network Descriptor for the IPTX Addressing Standard.) - "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-math-quant-new-para-redefi-bin-math-04.pdf>

(The 3rd Proof for the New Binary System, correcting the error in Binary Enumeration.)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-gwebs-vs-ieps-00.pdf>

(Defining the GWEBS – The Global Wide Emergency Broadcast System)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-iptx-dhcp-req-iptx-ip-add-spec-00.pdf>

(The development of the DHCP {Dynamic Host Configuration Protocol} for the IPTX IPSpec)
- "Work(s) in Progress"

<http://www.ietf.org/internet-drafts/draft-terrell-iptx-dns-req-iptx-ip-add-spec-03.pdf>

(The development of the DNS {Domain Naming Specification} the for IPTX IPSpec)
- "Work(s) in Progress"

Note: These Drafts has Expired at www.ietf.org Web Site. However, you can still find copies posted at Web Sites all over the World. {Suggestion; Perform Internet search using "Yahoo" or "Google", Key word: "[ETT-R&D Publications](#)"}

7. References:

Pure Mathematics:

1. **The Proof of Fermat's Last Theorem; The Revolution in Mathematical Thought {Nov 1979}**
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. **The Rudiments of Finite Algebra; The Results of Quantification {July 1983}**
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 that is Conditional, which supports the existence of a Finite Field (i.e. Distributive Law for Exponential Functions) and emphasized the possibility of an Alternate View of the Entire Mathematical field.
3. **The Rudiments of Finite Geometry; The Results of Quantification {June 2003}**
Building upon the preceding works from which the Mathematics of Quantification was derived. Where by it was logically concluded that there existed only 2 mathematical operations; Addition and Subtraction. In other words, the objectives this treatise maintained, which was derived from the foundation of the Mathematics of Quantification; involves not only the clarification of the misconceptions concerning Euclid's Fifth Postulate, and the logical foundation of his work, or the existence of 'Infinity in a Closed Bound Finite Space'. But, the logical derivation of the Foundational Principles that are consistence with the foundation presented by Euclid, which would establish the logical format for the Unification of all the Geometries presently existing.
4. **The Rudiments of Finite Trigonometry; The Results of Quantification {July 2004}**
The development of the concepts for Finite Trigonometry from the combined foundations derived from numbers 3 and 5, and the Mathematics of Quantification.
5. **The Mathematics of Quantification and the Metamorphosis of $\pi : \tau$ { October 2004}**
The logical derivation of the exact relationship between the Circumference and the Diameter of the Circle, which defines the measurement of the exact length of the Circle's Circumference, τ when the Radius is equal to '1'.

Physics:

- 1. The Mathematics of Quantification & The Rudiments of Finite Physics**
The Analysis of Newton's Laws of Motion...the Graviton' { December 2004}
Through the use of Finite Algebra, Geometry, Trigonometry, and # 5, investigation of the Laws of Classical Physics were found to be erroneous. This allowed the presentation of the initial work, which correct the flaws in Classical Physics, and establishes the foundation upon which there exist the possibility of a Grand Unified Field Theory for the Natural Sciences.

Additional References

- 1. 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.**
- 2. R Carnap (University of Chicago Press, 1947 / 1958) "Meaning and Necessity" A study in Semantics and Modal Logic.**
- 3. R Carnap (Dover Publications, 1958) " Introduction to Symbolic Logic and its Applications"**
- 4. Regis Desmeules (Cisco Press, April 24, 2003) " Cisco Self-Study: Implementing Cisco IPv6 Networks "**
- 5. Gary C. Kessler (Auerbach Press, August 1997) " Handbook on Local Area Networks "**
- 6. R. Hinden (Nokia) and S. Deering (Cisco Systems) RFC 2373 - " IP Version 6 Addressing Architecture "**

Author:

**Eugene Terrell,
ETT-R&D Publications
3312 64th Avenue Place
Oakland, CA. 94605
Voice: 510-636 – 9885
E-mail: eterrell00@netzero.net**

"This work is Dedicated to my first and only child, 'Princess Yahnay', because she is the gift of Dreams, the true treasure of my reality, and the 'Princess of the Universe'. (E.T. 2006)"

Copyright Statement

Copyright (C) The Internet Society (2006). This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

Disclaimer of Validity

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.