          The IPtX Specification Expands the 'CIDR' Architecture,
           with a Definition of CIDR and the Network Descriptor

Status of this Memo

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Abstract

    This paper Builds upon existing works and 'Works in Progress' that
    provides the foundation bases for the expansion of the 'CIDR'
    Architecture, and the Definition for CIDR and the Network Descriptor'.
    However, this work should only be considered an extension, hence,
    the Obsolescence of RFC's 1517, 1518, and 1519, because the Hardware
    and Software specifications has been implemented, and this work only
    extends the foundation they jointly established.

    "This work is Dedicated to my first and only child, 'Yahnay', who is;
     the Mover of Dreams, the Maker of Reality, and the 'Princess of the
     New Universe'. (E.T.)"

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. And while the popular claim boasted the elimination of the Address Class System. These were nevertheless, the Claims 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 represents a CLASS SYSTEM that has been SUB-DIVIDED, which represents a Class, or a Whole, having a Greater Number of Constituents.

In any case, 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 Router and the Routing Protocols are dealing with. In other words, the Class Addressing System is a format 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 change, nor does this process eliminate Existence of the Class itself. Hence, the CIDR Architecture actually reinforced the Class Concept, and proved without changing the Size or Specification of the 'IP Bit Mapped Address Class Range', or the IP Bit Mapped Address Space, that the Whole, is indeed the Sum of its Parts.

Chapter I: Staggering the Variables in the Default Addressing Structure:
        The Reality of the "Laws of the Octet"

    There is nothing Mystical nor Spooky about the "Laws of the Octet",
    because it is simply a guide to the Structure and foundation of the
    Divisions contained within each of the 5 Address Classes, which also
    provides the basic Rules for the construction of an IP Address from
    any one of the '4' Default Addressing Formats. In other words, the Laws
    of the Octet defines the Structure of the IPtX Address Classes, and
    explains the '4' Default Addressing Formats as a Staggering, which uses
    the 'Y' Variable to show the Octets in which the IP Address representing
    the IP Address Class Range Can Not Be Used. In any case, the '255'
    specification retains its previous definition, that being the Octet
    representing the Place Holder, which defines the portion of the IP Address
    denoting the IP Address Class Range of the Address Class in which it is
    used. (See Table 1-A, and Ex. 1-A)

                            Ex. 1-A

        If the Default Addressing Structure is given by; '255.y.x.x'.
        This would represent an IP Address in which the IP Address Class
        Range Can only be Used in the First Octet, the Second Octet,
        occupied by the Variable 'Y", can use All of IP Addresses Except
        those denote by the IP Address Class Range specified for use by
        the IP Address Class. In any case, the Octets Occupied by the 'X'
        Variable, can use any of the IP Addresses, which are contained in
        the IP Specification itself (Accept of course, when the Older
        Rules would apply; See Table 1-B).

    In other words, other than defining the Structure of the IP Address
    Classes for IPtX Specification, the Laws of the Octet, does nothing
    more than specify the rules, or reasons, for Staggering the 'X' and 'Y'
    variables used in the Default IP Addressing Format. In which case, it
    should be understood, for every occurrence of the 'Y' variable No IP
    Address from the IP Address Class Range can be used in the Octet that
    the 'Y' variable occupies.

Table 1-A

                {" The Laws of the Octet "}

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

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

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

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

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

5. For every OCTET within each Section or Division of every IP
   Address Class, that is defined by the Subnet Identifier, and
   it is preceded by a Section or Division within the same
   Address Class, whose reference is the preceding Octet Number.
   Then, the Octet of the preceding Section or Division must be
   defined by the Subnet Identifier. (Because with the exception
   of the First Octet, the Octet of the preceding Section, or
   Division, must be defined by 'Y', and can NOT be assigned the
   value denoted by the Integer Range, which DEFINES the IP
   Address Range assigned to that IP Address Class.)
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TABLE 1-B

1. The Network Address portion of an IP address, as Represented by the
   'Subnet Identifier', cannot be Set to either 'All Binary Ones' (255)
   or 'All Binary Zeros'(Which also Bars there use in the Zone IP)

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

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

4. The IP address 127.0.0.0 can never be assigned as a Network
   Address, because is the 'LoopBack' test IP Address.

Chapter II: The Expansion of the Definition of 'CIDR', the Network Descriptor,
          and The Obsolescence of RFC's 1517, 1518, and 1519.

    When defining the New 'CIDR' Architecture as being the replacement for
    RFC's 1517, 1518, and 1519, we must first list the functional components,
    or Highlights, noted as being the objectives or purpose supported by 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):

    It has been previously shown using the New 'CIDR' Architecture (which
    employs the New 'CIDR' Network Descriptor) that the Reality of IP Address
    EXHAUSTION, was in fact IP Address Waste, because Viable IP Address that
    could have been use to establish a Network Connection, outside of the
    Network Domain, were allocated for the Host IP Address Assignment. Which
    was clarified by a Comparison of the "Internet Protocol v4 Address Space,
    and the use of the CIDR Network Descriptor displayed in Table 6:

```
                        TABLE 1-C

          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


                                              CIDR
                                            Network
                           Class A         Descriptor

       A-1: Issued = 127 , Remaining = 1,040,513,921   /00:08

       A-2: Issued = None, Remaining = 516,160,512     /00:16

       A-3: Issued = None, Remaining = 256,048,128     /00:24

       A-4: Issued = None, Remaining = 252,047,376     /00:32



                           Class B

       B-1: Issued = 64  , Remaining = 784,514,496     /10:08

       B-2: Issued = None, Remaining = 197,672,960     /10:16

       B-3: Issued = None, Remaining = 49,807,360      /10:24

       B-4: Issued = None, Remaining = 16,777,216      /10:32



                           Class C

       C-1: Issued = 32  , Remaining = 458,321,632     /110:08

       C-2: Issued = None, Remaining = 57,741,312      /110:16

       C-3: Issued = None, Remaining = 7,274,496       /110:24

       C-4: Issued = None, Remaining = 1,048,576       /110:32
```

Class D

         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

   And while the Router's Table Growth remains an ongoing issue, it is not a
   problem that actually involves the New 'CIDR' Architecture, or the 'CIDR'
   Architecture in general. In other words, the Size of any of the 'Internet'
   or 'Globalnet' Router's Table should never approach the size of the
   Router's table being used by the Largest Network Domain using the
   Internet / Globalnet Backbone; e.g. the Largest ISP. Nevertheless, the
   problem here actually concerns the Structure of the Internet's
   (Globalnet's) Backbone, because it really does not have any structure at
   all. It is in essence, an aggregation, of what amounts to a Conglomeration
   of Wires, which does not maintain the Design Specification, nor
   Structural Continuity, Required in the Wiring Specification of a Single
   Family Dwelling.

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. Which 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,
    that 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. Which is not the problem
    with the IPt1 specification, because it De-Emphasizes the HOST IP Address,
    and gives it secondary functional value, when compared to the emphases
    and utilization of the Network IP Address. Needless to say, this was the
    foundation that was needed to get the 'Ball Rolling'. That is, while
    RFC 1519 developed the Mathematical foundation for the 'CIDR' Architecture,
    it never actually, or fully Exploited the benefits this Architecture
    maintains. Which is nevertheless, now fully exploited in the New 'CIDR'
    Architecture defined in this paper.

    The conclusion in support for the change to the New 'CIDR' Architecture,
    is actually derived from the definition, or the Meaning of CIDR, and the
    definition of the CIDR Network Descriptor.

Definition 2

    CIDR: (Classless Inter-Domain Routing) Is an IP Addressing Technique,
        using only Binary Numbers to derive, enumerate, or specify
        an IP Address that is some Fractional Subcomponent of any one, or
        Combination, of the '4' Octets comprising an IP Address. And while
        its original function was specifically the derivation of the
        Network IP Address for the 'Address Class C', it was later
        discovered that the HOST IP Address could be derived using the
        same techniques. This Technique, called Supernetting, has been
        expanded even further, using the IPtX Specification, which takes
        full advantage of the total number of IP Addresses and the entire
        IP Bit Mapped Addressing Specification, as in Ex. 1-B: '1 - 32
        Bits'.

    CIDR Network Descriptor: It is a short-hand method used to define a
                        IP Bit Mapped Network Address. 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 that is represented in Binary Notation.
                        And the Digits to the Left of the Colon
                        represents the 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 specify, or Mean, All of the
                        Network IP Addresses Contained in the IP Address
                        Class Specification (The Default CIDR Network
                        Descriptor; ' /XXXX:XX '.)

Nevertheless, while the modern text describing the 'CIDR' Architecture
only discusses the Supernetting of the 'Class C', RFC 1519 did in fact
lay the foundation for the Supernetting of the Class A and C. Furthermore,
RFC 1519 specified the procedures, or changes that needed to be
implemented in the Routing Protocols to take advantage of the 'CIDR'
Architecture to make the Supernetted IP Addresses Routable. In other
words, while RFC 1519 expanded the 'CIDR' Architecture to include the A
and C Address Classes, it did not fully exploit the 'CIDR' Architecture,
which would have used all of the IP Addresses contained in each of the 5
Address Classes. Needless to say, it should be clear, that RFC1519 did
provide the necessary foundation not only for the complete exploitation
of the 'CIDR' Architecture, but established the foundation for the 'IPtX'
Specification as well.

Moreover, it should also be understood that the Schematic Design of the
'IPtX' Specification is well suited for the 'CIDR' Architecture. This is
a feature in the Addressing Methods used in the 'IPtX' Specifications,
which allows the complete exploitation of the 'CIDR' Architecture, and
the development of the New CIDR Network Descriptor that was defined in
Definition 2 and demonstrated in Table 1-C, noted above. Nevertheless,
while the depiction of the CIDR Network Descriptor is somewhat different,
its functional use, as well as the Supernetting of an IP Address remains
the same in the New 'CIDR' Architecture. The only difference that the New
'CIDR' Architecture maintains, is that, it fully exploited in the IPtX
Specification, which incorporates a Schematic Design that makes every
IP Address available as viable IP Network Address, and waste no IP
Addresses on Host Address Assignments.

```
                           Ex. 1-B

                         Class E-4


    240-254/1111:25    =    25/~29    =    2^7  =    128
                            |              |         |
                            V              V         V
    240-254/1111:30    =    30/~29    =    2^2  =     4


    240-254/1111:31    =    31/~29    =    2^1  =     2


    240-254/1111:32    =    32/~29    =    2^0  =     0*
```

   *Note: Using the Current or Modern Method for Binary Enumeration,
         the solution here, regarding the Supernetting function and
         'CIDR', is the Correct answer. However, under the New Binary
         System, the solution would be; 2^0 = 1, and this would be True
         because, 'In the New Binary System: When considering the Network
         IP Address, it must be realized that Not All of the 32 Bit range
         of the IP Address is used in the Address Class range when dealing
         with a '32 Bit Mapped IP Address Space', as in /00:32. Still, if
         the Subnet IP = 126.126.126.126, then the Host IP Address could
         equal 126.126.126.127; or respectively 254.254.254.254 and
         254.254.254.253. In which case, it should be realized, by
         definition, that '255' and '000' can not be used.

Chapter IV: Security Considerations

    This document, whose primary objective was the explanation of the
    New definition of CIDR and the Network Descriptor, which resulted from
    several "Works in Progress", did not directly raise any security issues.
    Hence, there are no issues that warrant Security Consideration.

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