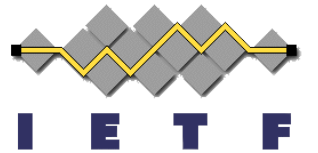


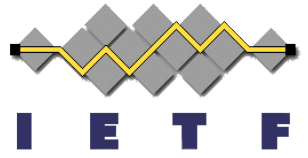
IETF YANG Routing Types Update

Authors: Xufeng Liu, Yingzhen Qu, Acee Lindem, Christian Hopps, Lou Berger

Tracker: <https://datatracker.ietf.org/doc/draft-ietf-rtgwg-routing-types/>

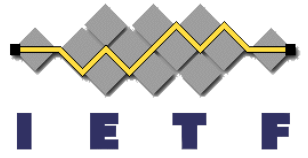


Recent Changes and History (1/2)



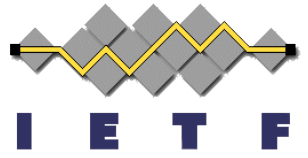
- February - YANG Doctor Review from Lada Lahotka
- Addition of BGP Subsequent Address family types as per comment from Sue Hares.
- Addition of percentage and timeticks64 types as per comment from Rob Wilton.
 - From OpenConfig types – used in BGP Model
- April - Second YANG Doctor review from Radek Krejčí.
 - Use boilerplate for YANG model headers as per Appendix C of RFC 6087BIS
- Split of IANA based types as per comment from Martin Bjorklund similar to RFC 7224

Recent Changes and History (2/2)



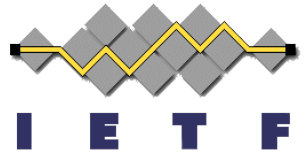
- May – Routing Directorate review from Stewart Bryant
- June 13th – Working Group Last Call
- Add ipv6-route-target, route-origin, and ipv6-route-origin as per comments from Jeff Haas
- Add geo-coordinates type as per comments from Robert Razuk
 - Protocol encodings reviewed and discussed across LISP, OSPF, IS-IS and BGP drafts
 - However, significant risk of change since the protocol drafts are new and it is not clear all the experts have reviewed the encoding
 - Will be moved to a separate ietf-geo-location module in separate draft for further review and independent progression.
 - Should new draft go immediately to WG document?

Addition of BGP Subsequent Address Family (SAFI)(1/2)



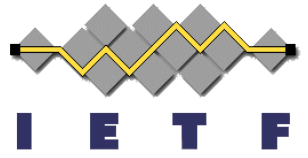
- Includes all SAFIs from "IANA Subsequent Address Family Identities (SAFI) Parameters Registry"
- Uses Base identity and identity refs
- Following YANG snippet shows basic identity and a few specific SAFIs (iana-routing-types has them all)

Addition of BGP SAFI (2/2)



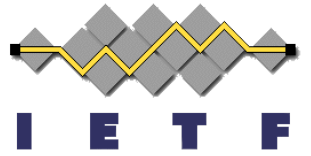
```
identity bgp-safi {
    description "Base identity from which identities describing BGP
    Subsequent Address Family Identifier (SAFI) - RFC 4760";
}
identify unicast-afi {
    base bgp-safi;
    description "Unicast SAFI - IANA Registry Assigned Number: 1";
}
identity multicast-safi {
    base bgp-safi;
    description "Multicast SAFI - IANA Registry Assigned Number: 2";
}
identity labeled-unicast-safi {
    base bgp-safi;
    description "Labeled Unicast SAFI - IANA Registry Assigned Number: 4";
}
```

Addition of percentage and timeticks64



```
typedef percentage {  
    type uint8 {  
        range "0..100";  
    }  
    description "Integer indicating a percentage value";  
}  
  
typedef timeticks64 {  
    type uint64;  
    description "This type is based on the timeticks type defined in RFC 6991, but with  
        64-bit width. It represents the time, modulo 2^64, in hundredths of a  
        second between two epochs.";  
    reference "RFC 6991 - Common YANG Data Types";  
}
```

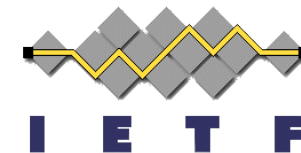
Separate Module for IANA Types



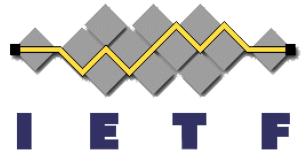
```
module iana-routing-types {
  namespace "urn:ietf:params:xml:ns:yang:iana-routing-types";
  prefix iana-rt-types;
  organization "IANA";
  contact " Internet Assigned Numbers Authority
    <snipped>
  identity address-family {
    description "Base identity from which identities describing address families are derived.";
  }
    <snipped>
  Identity bgp-safi {
    description "Base identity from which identities describing BGP
      Subsequent Address Family Identifier (SAFI) - RFC 4760.";
  }
    <snipped>
}
```

IPv6 Route Target

```
typedef ipv6-route-target {
    type string {
        pattern
            '((:[0-9a-fA-F]{0,4}):)([0-9a-fA-F]{0,4}:){0,5}'
            + '((([0-9a-fA-F]{0,4}:)?(:|[0-9a-fA-F]{0,4}))|'
            + '(((25[0-5]|2[0-4][0-9]|[01]?[0-9]?[0-9])\.){3}'
            + '(25[0-5]|2[0-4][0-9]|[01]?[0-9]?[0-9])))'
            + ':'
            + '(6553[0-5]|655[0-2]\d|65[0-4]\d{2}|6[0-4]\d{3}|'
            + '[0-5]?\d{0,3}\d)';
        pattern '(((^[^:]+:){6}([^[^:]+:[^:]+)|(.*\.\. *)))|'
            + '(((^[^:]+:)*[^[^:]+)?::([^[^:]+:)*[^[^:]+)?))'
            + ':'
            + '(6553[0-5]|655[0-2]\d|65[0-4]\d{2}|6[0-4]\d{3}|'
            + '[0-5]?\d{0,3}\d)';
    }
    description "<snipped>";
    reference "RFC5701: IPv6 Address Specific BGP Extended Community Attribute";
}
```



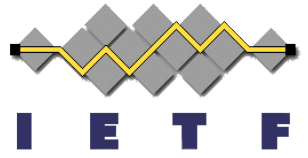
Route Origin and IPv6 Route Origin



- Route Origin is an 8-octet BGP extended community identifying the set of sites where the BGP route originated (RFC 4364).
 - Same pattern as Route Target only it adds the 2-octet-other-hex-number:6-octet-hex-number option.

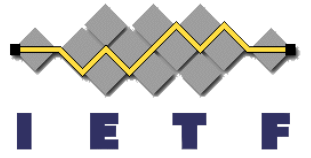
+ '([3-9a-fA-F]|[1-9a-fA-F][\da-fA-F]{1,3}):'
+ '[\da-fA-F]{1,12}';
- IPv6 Route Origin has same pattern as IPv6 Route Target

Route Target



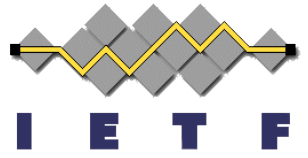
- Pending comment from Jeff Haas that ES-Import Route Target from RFC 7432 not included
 - Could add 2-octet-other-hex-number:6-octet-hex-number option.
 - + '([3-9a-fA-F]|[1-9a-fA-F][\da-fA-F]{1,3}):'
 - + '[\da-fA-F]{1,12}';
 - Or could add specific type 6 route target.
 - + '(6:[\da-fA-F]{1,12})';

Pending Changes to Draft



- Route Target flexibility (as discussed in previous slide)
- Remove geo-location grouping (as discussed previously)
- Improve description of the label stack grouping semantics
- Issue new version for publication

Routing Types Summary & Next Steps



- When it comes to common routing types – everybody has an opinion and we all know the analogy.
- It is time to progress this version of the model and limit further comments to the existing types as opposed to suggestions for new types.
 - Exceptions may be made for reviewed YANG types provided as code snippets.
- WG Co-chairs will request publication after IETF and progress the document.