

# Assigned Names and Numbers

## About this page

Broadband Forum "assigned names and numbers", i.e. things like URN prefixes, TCP port numbers and DHCP options that are used within BBF standards.

These names and numbers are a mixture of those assigned by outside organizations, e.g. IANA (Internet Assigned Numbers Authority) and those assigned directly by BBF.

## Link for Public Visitors

Return to the  
[BBF Public web site](#)

## Table of Contents

- 1. Names and Numbers Assigned by Other Organizations
  - 1.1. Enterprise Number and OUI
  - 1.2. IANA Interface Types
  - 1.3. TCP and UDP Ports
  - 1.4. Service Names
  - 1.5. URN Namespaces
  - 1.6. Media Types
  - 1.7. WebSocket Assignments
  - 1.8. Constrained RESTful Environments (CoRE) Parameters
  - 1.9. Network Service Header (NSH) Parameters
  - 1.10. TLS Exporter Labels
- 2. URN Namespaces
  - 2.1. urn:dsforum-org:
  - 2.2. urn:broadband-forum-org:
  - 2.3. urn:bbf:
- 3. Common Sub-options
- 4. DHCP Sub-options
  - 4.1. DHCPv4 Option 43 Sub-options (Codes)
  - 4.2. DHCPv4 Option 82, Sub-option 9 Codes
  - 4.3. DHCPv4 Option 125 Sub-options
  - 4.4. DHCPv6 Option 17 Sub-options
- 5. PPPoE Tags
- 6. RADIUS Attributes
- 7. IP Flow Information Export (IPFIX) Information Element Identifiers
- 8. Packet Forwarding Control Protocol (PFCP) Information Element (IE) Extensions

### 1. 1. Names and Numbers Assigned by Other Organizations

#### 1.1. 1.1. Enterprise Number and OUI

The Broadband Forum Enterprise Number is 3561 decimal (0x0DE9) and is listed in the [IANA Private Enterprise Numbers Registry](#). The Enterprise Number also identifies the BBF's node in the object identifier (OID) hierarchy, with the full arc extending back to its root defined as follows: 1.3.6.1.4.1.3561. Information on the object identifier hierarchy can be found at ITU-T X.660 and ISO/IEC 9834.

The Broadband Forum IEEE OUI is 0x00256D. More information regarding IEEE OUI is at <https://standards.ieee.org/develop/regauth/oui/>.

#### 1.2. 1.2. IANA Interface Types

The following interface types were registered by BBF with IANA and are listed on the [IANA MIB Module Registrations](#) page, which references the [iana-if-type](#) YANG module and the [IANAifType](#) MIB.

| Interface Type | Reference | Notes |
|----------------|-----------|-------|
| fastdsl        | TR-355    |       |
| ghn            | TR-374    |       |
| ptm            | TR-383    |       |

### 1.3. 1.3. TCP and UDP Ports

The following ports were registered by BBF with IANA and are listed in the [IANA Service Name and Transport Protocol Port Number Registry](#).

| Service Name | Port Number | Transport Protocol | Reference | Notes                                                           |
|--------------|-------------|--------------------|-----------|-----------------------------------------------------------------|
| pon-ictp     | 7202        | tcp                | TR-352    |                                                                 |
| cwmp         | 7547        | tcp                | TR-069    | ACS and Connection Request URLs can use this port               |
| cwmp         | 7547        | udp                | TR-069    | UDP Connection Request URL can use this port (it's the default) |

### 1.4. 1.4. Service Names

The following Service Names (without ports) were registered by BBF and are listed in the [IANA Service Name and Transport Protocol Port Number Registry](#). Additional links are provided here to identify references for use of these Services Names, and defined TXT parameters associated with them.

| Service Name  | Transport Protocol | Published Reference or Current Project | TXT Parameters                               | Subtypes            |
|---------------|--------------------|----------------------------------------|----------------------------------------------|---------------------|
| usp-agt-coap  | udp                | <a href="#">TR-369</a>                 | path=<resource path>                         | No defined subtypes |
| usp-agt-http  | tcp                | <a href="#">TR-369</a>                 | name=<device or USP friendly name>           |                     |
| usp-agt-mqtt  | tcp                | <a href="#">TR-369</a>                 | encrypt                                      |                     |
| usp-agt-stomp | tcp                | <a href="#">TR-369</a>                 | code=<provisioning code>                     |                     |
| usp-agt-ws    | tcp                | <a href="#">TR-369</a>                 | retry-min=< USP retry minimum wait interval> |                     |
| usp-ctr-coap  | udp                | <a href="#">TR-369</a>                 | retry-mult=< USP retry interval multiplier>  |                     |
| usp-ctr-http  | tcp                | <a href="#">TR-369</a>                 |                                              |                     |

|               |     |        |  |
|---------------|-----|--------|--|
| usp-ctr-mqtt  | tcp | TR-369 |  |
| usp-ctr-stomp | tcp | TR-369 |  |
| usp-ctr-ws    | tcp | TR-369 |  |

#### 1.5. 1.5. URN Namespaces

The ds1forum-org, broadband-forum-org and bbf URN namespaces have been registered with IANA. See [RFC 8057 \(URN Namespaces for Broadband Forum\)](#).

The first two (old) prefixes will continue to be used for new assignments relating to the standards with which they are already used, and the third (new) prefix will be used for assignments relating to all new standards.

To get a namespace assignment, requesters must go through the Broadband Forum project and documentation creation process.

#### 1.6. 1.6. Media Types

IANA media type assignments are listed at <https://www.iana.org/assignments/media-types/media-types.xhtml>.

The following Media Types have been assigned to BBF.

| Media Type                       | Reference                                                                                                                                                                                                                                                                                                                        |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| application/vnd.bbf.usp.error    | <a href="#">TR-369: User Services Platform (USP)</a><br>This Media Type is currently described in the draft Issue 1 Amendment 1 of TR-369. This will be available at the above-referenced URL after TR-369i1a1 is published.                                                                                                     |
| application/vnd.bbf.usp.msg      | <a href="#">TR-369: User Services Platform (USP)</a>                                                                                                                                                                                                                                                                             |
| application/vnd.bbf.usp.msg+json | <a href="#">TR-369: User Services Platform (USP)</a><br>This Media Type is not mentioned in the USP specification, as it is not intended for use in active deployments. It is intended for debugging and testing purposes only. It indicates the USP Record and Message headers are expressed in JSON without Protobuf encoding. |

#### 1.7. 1.7. WebSocket Assignments

IANA WebSocket assignments are listed at <https://www.iana.org/assignments/websocket/websocket.xhtml>.

The following WebSocket Subprotocol Names have been assigned to BBF.

| WebSocket Subprotocol Name | Reference                                            |
|----------------------------|------------------------------------------------------|
| v1.usp                     | <a href="#">TR-369: User Services Platform (USP)</a> |

The following WebSocket Extension Names have been assigned to BBF.

| WebSocket Extension Name | Reference                                            |
|--------------------------|------------------------------------------------------|
| bbf-usp-protocol         | <a href="#">TR-369: User Services Platform (USP)</a> |

#### 1.8. 1.8. Constrained RESTful Environments (CoRE) Parameters

IANA CoRE parameter assignments are listed at <https://www.iana.org/assignments/core-parameters/core-parameters.xhtml>.

The following CoRE parameter values have been assigned to BBF.

| Registry                                          | CoRE Parameter Value | Reference                                            |
|---------------------------------------------------|----------------------|------------------------------------------------------|
| Resource Type (rt=) Link Target Attribute         | bbf.usp.endpoint     | <a href="#">TR-369: User Services Platform (USP)</a> |
| Interface Description (if=) Link Target Attribute | bbf.usp.c            | <a href="#">TR-369: User Services Platform (USP)</a> |
| Interface Description (if=) Link Target Attribute | bbf.usp.a            | <a href="#">TR-369: User Services Platform (USP)</a> |

#### 1.9. 1.9. Network Service Header (NSH) Parameters

IANA NSH parameter assignments are listed at <https://www.iana.org/assignments/nsh>.

The following NSH Metadata (MD) classes have been assigned to BBF.

| Range  | Meaning                   |
|--------|---------------------------|
| 0x0200 | BBF Specific NSH Metadata |

#### 1.10. 1.10. TLS Exporter Labels

IANA TLS Exporter Label assignments are listed at <https://www.iana.org/assignments/tls-parameters/tls-parameters.xhtml>. The process for registering new labels is defined in [RFC 8447](#); registration requests should be sent to the [tls-reg-review@ietf.org](mailto:tls-reg-review@ietf.org) mailing list as specified in [section 17](#).

BBF-registered TLS Exporter Label names will be of the form "EXPORTER-BBF-*<function>*" where "*<function>*" is a unique function name within the BBF scope.

- "*<function>*" should use words (not acronyms), with initial capital letters and hyphen separators. For example, "EXPORTER-BBF-Dying-Gasp"

The following TLS Exporter Labels have been assigned to BBF.

| Label                   | DTLS-OK | Recommended | Reference                                                                                     |
|-------------------------|---------|-------------|-----------------------------------------------------------------------------------------------|
| EXPORTER-BBF-Dying-Gasp | N       | N           | <a href="#">TR-301i2a1: Architecture and Requirements for Fiber to the Distribution Point</a> |
| EXPORTER-BBF-USP-Record | N       | N           | <a href="#">TR-369i1a2: User Services Platform (USP)</a>                                      |

## 2. 2. URN Namespaces

### 2.1. 2.1. urn:dslforum-org:

| Namespace                                                                                                                                                       | Usage                             | Reference          | Notes                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| urn:dslforum-org:device:                                                                                                                                        | BBF-defined UPnP devices          | TR-064i1<br>TR-133 | Both these TRs are DEPRECATED<br><br>TR-064i2 is not deprecated, but does not make use of this namespace.                                                                                                                                                                      |
| urn:dslforum-org:service:                                                                                                                                       | BBF-defined UPnP services         | TR-064i1<br>TR-133 | Both these TRs are DEPRECATED<br><br>TR-064i2 is not deprecated, but does not make use of this namespace.                                                                                                                                                                      |
| urn:dslforum-org:cwmp- <i>n-m</i>                                                                                                                               | CWMP version <i>n.m</i>           | TR-069             | <i>n</i> and <i>m</i> indicate the CWMP major and minor version respectively<br><br>Some examples: <ul style="list-style-type: none"><li>• urn:dslforum-org:cwmp-1-0</li><li>• urn:dslforum-org:cwmp-1-1</li></ul>                                                             |
| urn:dslforum-org:sip<br>urn:dslforum-org:h.323<br>urn:dslforum-org:h.248<br>urn:dslforum-org:mgcp<br>urn:dslforum-org:pppoe<br>urn:dslforum-org:sdp- <i>m-t</i> | QoS protocol and flow identifiers | TR-181<br>Issue 2  | <i>m</i> and <i>t</i> indicate media type and transport respectively<br><br>Note: pppoe is used both as a protocol and a flow identifier, and sdp is used only as a flow identifier. In theory additional protocol and flow identifiers could be defined, but this is unlikely |

### 2.2. 2.2. urn:broadband-forum-org:

| Namespace                                                                                  | Usage                               | Reference                | Notes                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| urn:broadband-forum-org:tr- <i>nnn-i-a-c</i><br>urn:broadband-forum-org:tr- <i>nnn-i-a</i> | References to BBF Technical Reports | TR-106<br>TR-181<br>etc. | <i>nnn</i> , <i>i</i> , <i>a</i> and <i>c</i> indicate the TR number, Issue, Amendment and Corrigendum respectively (- <i>c</i> is optional)<br><br>Note: <i>wt</i> is used instead of <i>tr</i> to reference a BBF Working Text (never in a published standard)<br><br>Some examples: <ul style="list-style-type: none"><li>• urn:broadband-forum-org:tr-069-1-5-0</li><li>• urn:broadband-forum-org:tr-181-2-11</li></ul> |

|                               |                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------|----------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| urn:broadband-forum-org:cwmp: | XML Schemas used with CWMP | TR-069<br>TR-106 | Some examples: <ul style="list-style-type: none"> <li>urn:broadband-forum-org:cwmp:xmppConnReq-1-0</li> <li>urn:broadband-forum-org:cwmp:lnnotif-1-0</li> <li>urn:broadband-forum-org:cwmp:datamodel-1-5</li> <li>urn:broadband-forum-org:cwmp:datamodel-report-0-1</li> <li>urn:broadband-forum-org:cwmp:devicetype-1-3</li> <li>urn:broadband-forum-org:cwmp:devicetype-features</li> </ul> |
| urn:broadband-forum-org:ipdr: | XML Schemas used with IPDR | TR-232           | Some examples: <ul style="list-style-type: none"> <li>urn:broadband-forum-org:ipdr:tr-232-1-0</li> </ul>                                                                                                                                                                                                                                                                                      |

### 2.3. 2.3. urn:bbf:

| Namespace     | Usage                      | Reference                     | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|----------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| urn:bbf:yang: | BBF YANG module namespaces | <a href="#">YANG Projects</a> | <p>Within this namespace, the following have been defined:</p> <ul style="list-style-type: none"> <li>urn:bbf:yang:bbf-alarm-types</li> <li>urn:bbf:yang:bbf-ancp</li> <li>urn:bbf:yang:bbf-ancp-alarm-types</li> <li>urn:bbf:yang:bbf-ancp-fastdsl-access-extensions</li> <li>urn:bbf:yang:bbf-ancp-fastdsl-thresholds</li> <li>urn:bbf:yang:bbf-ancp-interfaces</li> <li>urn:bbf:yang:bbf-availability</li> <li>urn:bbf:yang:bbf-baa-pan</li> <li>urn:bbf:yang:bbf-contact</li> <li>urn:bbf:yang:bbf-d-olt-dhcpra</li> <li>urn:bbf:yang:bbf-d-olt-message-monitor</li> <li>urn:bbf:yang:bbf-d-olt-mgmd</li> <li>urn:bbf:yang:bbf-d-olt-network-function-types</li> <li>urn:bbf:yang:bbf-d-olt-onuauth-types</li> <li>urn:bbf:yang:bbf-d-olt-onuauth</li> <li>urn:bbf:yang:bbf-d-olt-pppoe-intermediate-agent</li> <li>urn:bbf:yang:bbf-device</li> <li>urn:bbf:yang:bbf-device-aggregation</li> <li>urn:bbf:yang:bbf-device-types</li> <li>urn:bbf:yang:bbf-dot1q-cfm</li> <li>urn:bbf:yang:bbf-dot1q-cfm-alarm-types</li> <li>urn:bbf:yang:bbf-dot1q-cfm-interfaces</li> <li>urn:bbf:yang:bbf-dot1q-cfm-interfaces-state</li> <li>urn:bbf:yang:bbf-dot1q-cfm-l2-forwarding</li> <li>urn:bbf:yang:bbf-dot1q-types</li> <li>urn:bbf:yang:bbf-end-user</li> <li>urn:bbf:yang:bbf-equipment-inventory</li> <li>urn:bbf:yang:bbf-ethernet-performance-management</li> <li>urn:bbf:yang:bbf-fast</li> <li>urn:bbf:yang:bbf-fast-alarm-types</li> <li>urn:bbf:yang:bbf-fastdsl</li> </ul> |

- urn:bbf:yang:bbf-frame-classification
- urn:bbf:yang:bbf-frame-processing-profiles
- urn:bbf:yang:bbf-frame-processing-types
- urn:bbf:yang:bbf-gbond
- urn:bbf:yang:bbf-gbond-state
- urn:bbf:yang:bbf-ghn
- urn:bbf:yang:bbf-ghs
- urn:bbf:yang:bbf-grpc-client
- urn:bbf:yang:bbf-grpc-server
- urn:bbf:yang:bbf-hardware
- urn:bbf:yang:bbf-hardware-cpu
- urn:bbf:yang:bbf-hardware-storage-drives
- urn:bbf:yang:bbf-hardware-rpf-dpu
- urn:bbf:yang:bbf-hardware-rpf-dpu-alarm-types
- urn:bbf:yang:bbf-hardware-rpf-dpu-state
- urn:bbf:yang:bbf-hardware-transceiver-alarm-types
- urn:bbf:yang:bbf-hardware-transceivers
- urn:bbf:yang:bbf-hardware-transceivers-xpon
- urn:bbf:yang:bbf-hardware-types
- urn:bbf:yang:bbf-icmpv6
- urn:bbf:yang:bbf-icmpv6-forwarding
- urn:bbf:yang:bbf-icmpv6-profile-common
- urn:bbf:yang:bbf-if-type
- urn:bbf:yang:bbf-inet-types
- urn:bbf:yang:bbf-interface-usage
- urn:bbf:yang:bbf-interfaces-performance-management
- urn:bbf:yang:bbf-interfaces-remote-hardware-state
- urn:bbf:yang:bbf-interfaces-statistics-management
- urn:bbf:yang:bbf-l2-dhcpv4-relay
- urn:bbf:yang:bbf-l2-dhcpv4-relay-forwarding
- urn:bbf:yang:bbf-l2-dhcpv4-relay-profile-common
- urn:bbf:yang:bbf-l2-forwarding
- urn:bbf:yang:bbf-l2-forwarding-alarm-types
- urn:bbf:yang:bbf-l2-forwarding-shared-fdb
- urn:bbf:yang:bbf-l2-terminations
- urn:bbf:yang:bbf-ldra
- urn:bbf:yang:bbf-ldra-profile-common
- urn:bbf:yang:bbf-link-table
- urn:bbf:yang:bbf-location
- urn:bbf:yang:bbf-location-types
- urn:bbf:yang:bbf-melt
- urn:bbf:yang:bbf-mgmd
- urn:bbf:yang:bbf-mgmd-common
- urn:bbf:yang:bbf-mgmd-mrd
- urn:bbf:yang:bbf-mgmd-types
- urn:bbf:yang:bbf-network-function
- urn:bbf:yang:bbf-network-function-client
- urn:bbf:yang:bbf-network-function-server
- urn:bbf:yang:bbf-network-function-types
- urn:bbf:yang:bbf-network-map
- urn:bbf:yang:bbf-network-types
- urn:bbf:yang:bbf-node-types
- urn:bbf:yang:bbf-olt-relay-agent-sci
- urn:bbf:yang:bbf-olt-d-olt
- urn:bbf:yang:bbf-pppoe-intermediate-agent

- urn:bbf:yang:bbf-ptm
- urn:bbf:yang:bbf-qos-classifiers
- urn:bbf:yang:bbf-qos-composite-filters
- urn:bbf:yang:bbf-qos-enhanced-scheduling
- urn:bbf:yang:bbf-qos-enhanced-scheduling-state
- urn:bbf:yang:bbf-qos-filters
- urn:bbf:yang:bbf-qos-policer-envelope-profiles
- urn:bbf:yang:bbf-qos-policies
- urn:bbf:yang:bbf-qos-policies-state
- urn:bbf:yang:bbf-qos-policies-sub-interface-rewrite
- urn:bbf:yang:bbf-qos-policies-sub-interfaces
- urn:bbf:yang:bbf-qos-policing
- urn:bbf:yang:bbf-qos-policing-state
- urn:bbf:yang:bbf-qos-policing-types
- urn:bbf:yang:bbf-qos-rate-control
- urn:bbf:yang:bbf-qos-shaping
- urn:bbf:yang:bbf-qos-traffic-mngt
- urn:bbf:yang:bbf-qos-traffic-mngt-state
- urn:bbf:yang:bbf-qos-types
- urn:bbf:yang:bbf-selt
- urn:bbf:yang:bbf-software-management
- urn:bbf:yang:bbf-software-management-voice
- urn:bbf:yang:bbf-sub-interface-tagging
- urn:bbf:yang:bbf-sub-interfaces
- urn:bbf:yang:bbf-subscriber-profile-common
- urn:bbf:yang:bbf-subscriber-profiles
- urn:bbf:yang:bbf-subscriber-types
- urn:bbf:yang:bbf-vlan-sub-interface-profile-dhcpv4
- urn:bbf:yang:bbf-vlan-sub-interface-profile-dhcpv6
- urn:bbf:yang:bbf-vlan-sub-interface-profile-fp
- urn:bbf:yang:bbf-vlan-sub-interface-profile-icmpv6
- urn:bbf:yang:bbf-vlan-sub-interface-profile-pppoe
- urn:bbf:yang:bbf-vlan-sub-interface-profile-qos
- urn:bbf:yang:bbf-vlan-sub-interface-profile-usage
- urn:bbf:yang:bbf-vlan-sub-interface-profiles
- urn:bbf:yang:bbf-xpon
- urn:bbf:yang:bbf-xpon-burst-profiles
- urn:bbf:yang:bbf-xponani
- urn:bbf:yang:bbf-xponani-power-management
- urn:bbf:yang:bbf-xpongemtcont
- urn:bbf:yang:bbf-xpongemtcont-performance-management
- urn:bbf:yang:bbf-xpongemtcont-qos
- urn:bbf:yang:bbf-xpon-defects
- urn:bbf:yang:bbf-xpon-if-type
- urn:bbf:yang:bbf-xpon-onu-authentication-features
- urn:bbf:yang:bbf-xpon-onu-authentication-types
- urn:bbf:yang:bbf-xpon-onu-authentication
- urn:bbf:yang:bbf-xpon-onu-state
- urn:bbf:yang:bbf-xpon-onu-types

|               |                                       |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|---------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                       |                                         | <ul style="list-style-type: none"> <li>• urn:bbf:yang:bbf-xpon-performance-management</li> <li>• urn:bbf:yang:bbf-xpon-power-management</li> <li>• urn:bbf:yang:bbf-xpon-types</li> <li>• urn:bbf:yang:bbf-xponvani</li> <li>• urn:bbf:yang:bbf-xponvani-onu-authentication-groupings</li> <li>• urn:bbf:yang:bbf-xponvani-onu-authentication</li> <li>• urn:bbf:yang:bbf-xponvani-power-management</li> <li>• urn:bbf:yang:bbf-vdsl</li> <li>• urn:bbf:yang:bbf-vdsl-alarm-types</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-dhcpv4</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-dhcpv6</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-fp</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-pppoe</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-qos</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profile-usage</li> <li>• urn:bbf:yang:bbf-vlan-sub-interface-profiles</li> <li>• urn:bbf:yang:bbf-yang-types</li> </ul> |
| urn:bbf:imap: | BBF LMAP Performance Metrics Registry | <a href="#">TR-181i2a12 Appendix XX</a> | <p>TR-181i2a12 Appendix XX provides Theory of Operation and describes usage.</p> <p>The format for a registry entry within this namespace is:</p> <ul style="list-style-type: none"> <li>• urn:bbf:imap:&lt;BBF TR&gt;:&lt;DiagnosticProfileName&gt;</li> </ul> <p>Example:</p> <ul style="list-style-type: none"> <li>• urn:bbf:imap:tr-181-2-11-0:UploadDiagnostics-1</li> </ul> <p>The following IETF references define format of a registry entry and provide examples.</p> <ul style="list-style-type: none"> <li>• <a href="#">draft-ietf-ippm-metric-registry</a></li> <li>• <a href="#">draft-ietf-ippm-initial-registry</a></li> </ul>                                                                                                                                                                                                                                                                                                                        |
| urn:bbf:usp:  | USP                                   | <a href="#">TR-369</a>                  | <p>Within this namespace, the following have been defined in TR-369:</p> <ul style="list-style-type: none"> <li>• urn:bbf:usp:id:&lt;Endpoint ID&gt;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

### 3. 3. Common Sub-options

Common Sub-option codes used with DHCPv4, DHCPv6, PPPoE and RADIUS. Code range: 1-254 (0x01-0xfe), 8 bits.

| Dec | Hex | Usage | Reference | Notes |
|-----|-----|-------|-----------|-------|
|-----|-----|-------|-----------|-------|

|         |           |                                                 |                   |                                     |
|---------|-----------|-------------------------------------------------|-------------------|-------------------------------------|
| 1       | 0x01      | Agent Circuit ID                                | TR-156 / TR-177   |                                     |
| 2       | 0x02      | Agent Remote ID                                 | TR-156 / TR-177   |                                     |
| 3-128   | 0x03-0x80 | Unassigned                                      |                   |                                     |
| 129     | 0x81      | Actual data rate Upstream                       | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 130     | 0x82      | Actual data rate Downstream                     | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 131     | 0x83      | Minimum Data Rate Upstream                      | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 132     | 0x84      | Minimum Data Rate Downstream                    | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 133     | 0x85      | Attainable Data Rate Upstream                   | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 134     | 0x86      | Attainable Data Rate Downstream                 | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 135     | 0x87      | Maximum Data Rate Upstream                      | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 136     | 0x88      | Maximum Data Rate Downstream                    | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 137     | 0x89      | Minimum Data Rate Upstream in low power state   | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 138     | 0x8a      | Minimum Data Rate Downstream in low power state | TR-156 / TR-177   | 32 bit binary value in kbps         |
| 139     | 0x8b      | Maximum Interleaving Delay Upstream             | TR-156 / TR-177   | 32 bit binary value in milliseconds |
| 140     | 0x8c      | Actual interleaving Delay Upstream              | TR-156 / TR-177   | 32 bit binary value in milliseconds |
| 141     | 0x8d      | Maximum Interleaving Delay Downstream           | TR-156 / TR-177   | 32 bit binary value in milliseconds |
| 142     | 0x8e      | Actual interleaving Delay Downstream            | TR-156 / TR-177   | 32 bit binary value in milliseconds |
| 143     | 0x8f      | Unassigned                                      |                   |                                     |
| 144     | 0x90      | Access loop encapsulation                       | TR-101 Appendix A | 24 bit binary value                 |
| 145-154 | 0x91-0x9a | Unassigned                                      |                   |                                     |
| 155     | 0x9b      | Expected throughput (ETR) upstream              | TR-301            | 32 bit binary value in kbps         |
| 156     | 0x9c      | Expected throughput (ETR) downstream            | TR-301            | 32 bit binary value in kbps         |

|         |           |                                                    |                                 |                             |
|---------|-----------|----------------------------------------------------|---------------------------------|-----------------------------|
| 157     | 0x9d      | Attainable expected throughput (ATTETR) upstream   | TR-301                          | 32 bit binary value in kbps |
| 158     | 0x9e      | Attainable expected throughput (ATTETR) downstream | TR-301                          | 32 bit binary value in kbps |
| 159     | 0x9f      | Gamma data rate (GDR) upstream                     | TR-301                          | 32 bit binary value in kbps |
| 160     | 0xa0      | Gamma data rate (GDR) downstream                   | TR-301                          | 32 bit binary value in kbps |
| 161     | 0xa1      | Attainable gamma data rate (ATTGDR) upstream       | TR-301                          | 32 bit binary value in kbps |
| 162     | 0xa2      | Attainable gamma data rate (ATTGDR) downstream     | TR-301                          | 32 bit binary value in kbps |
| 163-191 | 0xa3-0xbf | Unassigned                                         |                                 |                             |
| 192     | 0xc0      | DPU Discovery                                      | TR-301 Issue 2 Section 16.5.2.1 |                             |
| 193     | 0xc1      | PMA Offer                                          | TR-301 Issue 2 Section 16.5.2.2 |                             |
| 194-254 | 0xc2-0xfe | Unassigned                                         |                                 |                             |

#### 4. 4. DHCP Sub-options

##### 4.1. 4.1. DHCPv4 Option 43 Sub-options (Codes)

[RFC 2132 Section 8.4](#): Option 43: Vendor Specific Information. Code range: 1-254 (0x01-0xfe), 8 bits.

| Dec   | Hex       | Usage         | Reference          | Notes                                                                                                                                                                                                        |
|-------|-----------|---------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-4   | 0x01-0x04 | ACS discovery | TR-069 Section 3.1 | Sub-option usage: <ul style="list-style-type: none"> <li>• 1: ACS URL</li> <li>• 2: Provisioning code</li> <li>• 3: CWMP retry minimum wait interval</li> <li>• 4: CWMP retry interval multiplier</li> </ul> |
| 5-254 | 0x05-0xfe | Unassigned    |                    |                                                                                                                                                                                                              |

##### 4.2. 4.2. DHCPv4 Option 82, Sub-option 9 Codes

[RFC 4243](#): Vendor-Specific Information Suboption for the Dynamic Host Configuration Protocol (DHCP) Relay Agent Option. Code range 1-254 (0x01-0xfe), 8 bits.

The following Sub-options are used with enterprise number 3561 (BBF).

| Dec | Hex | Usage | Reference | Notes |
|-----|-----|-------|-----------|-------|
|-----|-----|-------|-----------|-------|

|         |           |                    |                   |  |
|---------|-----------|--------------------|-------------------|--|
| 1-2     | 0x01-0x02 | Common Sub-options | TR-156 / TR-177   |  |
| 3-128   | 0x03-0x80 | Unassigned         |                   |  |
| 129-142 | 0x81-0x8e | Common Sub-options | TR-156 / TR-177   |  |
| 143     | 0x8f      | Unassigned         |                   |  |
| 144     | 0x90      | Common Sub-options | TR-101 Appendix A |  |
| 145-154 | 0x91-0x9a | Unassigned         |                   |  |
| 155-162 | 0x9b-0xa2 | Common Sub-options | TR-301            |  |
| 163-191 | 0xa3-0xbf | Unassigned         |                   |  |
| 192-193 | 0xc0-0xc1 | Common Sub-options | TR-301 Issue 2    |  |
| 194-254 | 0xc2-0xfe | Unassigned         |                   |  |

#### 4.3. 4.3. DHCPv4 Option 125 Sub-options

[RFC 3925 Section 4](#): Option 125: Vendor-Identifying Vendor-Specific Information. Sub-option range: 1-254 (0x01-0xfe), 8 bits.

The following Sub-options are used with enterprise number 3561 (BBF).

| Dec | Hex       | Usage       | Reference        | Notes                                                                                                                                                                                                                         |
|-----|-----------|-------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-4 | 0x01-0x04 | Device info | TR-124 WAN.DHCPC | Sub-option usage: <ul style="list-style-type: none"> <li>• 1: Manufacturer OUI</li> <li>• 2: Product class</li> <li>• 3: Model name</li> <li>• 4: Serial number</li> </ul> <b>Sub-options 1-4 overlap with TR-069 Annex F</b> |

|         |           |                                    |                                                    |                                                                                                                                                                                                                                                                                                                                  |
|---------|-----------|------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-6     | 0x01-0x06 | Device / Gateway association       | TR-069 Annex F                                     | Sub-option usage: <ul style="list-style-type: none"> <li>• 1: Device manufacturer OUI</li> <li>• 2: Device serial number</li> <li>• 3: Device product class</li> <li>• 4: Gateway manufacturer OUI</li> <li>• 5: Gateway serial number</li> <li>• 6: Gateway product class</li> </ul> <b>Sub-options 1-4 overlap with TR-124</b> |
| 7-10    | 0x07-0x0a | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                                                                                  |
| 11-14   | 0x0b-0x0e | ACS discovery                      | TR-069 Section 3.1                                 | Sub-option usage: <ul style="list-style-type: none"> <li>• 11: ACS URL</li> <li>• 12: Provisioning code</li> <li>• 13: CWMP retry minimum wait interval</li> <li>• 14: CWMP retry interval multiplier</li> </ul>                                                                                                                 |
| 15-16   | 0x0f-0x10 | Reserved                           | TR-069                                             | Reserved because they're assigned as DHCPv6 option 17 sub-options                                                                                                                                                                                                                                                                |
| 17-20   | 0x11-0x14 | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                                                                                  |
| 21-23   | 0x15-0x17 | GRE tunneling                      | TR-317 Section 7.1.3.3.2                           | Sub-option usage: <ul style="list-style-type: none"> <li>• 21: Tunnel type</li> <li>• 22: Server endpoint</li> <li>• 23: Client endpoint</li> </ul>                                                                                                                                                                              |
| 24      | 0x18      | Client requirements                | TR-317 Section 7.4.3.7                             | Sub-option usage: <ul style="list-style-type: none"> <li>• 24: Device type</li> </ul>                                                                                                                                                                                                                                            |
| 25-29   | 0x19-0x1d | USP Controller Discovery           | <a href="#">TR-369 Discovery and Advertisement</a> | Sub-option usage: <ul style="list-style-type: none"> <li>• 25: URL of the Controller</li> <li>• 26: Provisioning code</li> <li>• 27: USP retry mini-mum wait interval</li> <li>• 28: USP retry interval multiplier</li> <li>• 29: Controller Endpoint ID</li> </ul>                                                              |
| 30-191  | 0x1e-0xbf | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                                                                                  |
| 192-193 | 0xc0-0xc1 | <a href="#">Common Sub-options</a> | TR-301 Issue 2                                     |                                                                                                                                                                                                                                                                                                                                  |
| 194-254 | 0xc2-0xfe | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                                                                                  |

#### 4.4. 4.4. DHCPv6 Option 17 Sub-options

[RFC 3315 Section 22.17](#): Option 17: Vendor-specific Information. Sub-option range: 1-65534 (0x0001-0xffff), 16 bits.

The following Sub-options are used with enterprise number 3561 (BBF).

| Dec   | Hex                       | Usage                              | Reference                | Notes                                                                                                                                                                                                                                                                                                                                             |
|-------|---------------------------|------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-2   | 0x00<br>01-0x<br>0002     | <a href="#">Common Sub-options</a> | TR-156 / TR-177          | <b>Sub-options 1-2 overlap with TR-069</b>                                                                                                                                                                                                                                                                                                        |
| 1-4   | 0x00<br>01-<br>0x00<br>04 | ACS discovery                      | TR-069 Section 3.1       | Sub-option usage: <ul style="list-style-type: none"> <li>• 1: URL of the ACS</li> <li>• 2: Provisioning code</li> <li>• 3: CWMP retry minimum wait interval</li> <li>• 4: CWMP retry interval multiplier</li> </ul> <b>Sub-options 1-2 overlap with TR-156 / TR-177</b>                                                                           |
| 5-6   | 0x00<br>05-<br>0x00<br>06 | Reserved                           | TR-069                   | Reserved because they were used prior to TR-069 Amendment 5, and because they're assigned as DHCPv4 option 125 sub-options                                                                                                                                                                                                                        |
| 7-10  | 0x00<br>07-<br>0x00<br>0a | Unassigned                         |                          |                                                                                                                                                                                                                                                                                                                                                   |
| 11-16 | 0x00<br>0b-<br>0x00<br>10 | Device / Gateway association       | TR-069 Annex F           | Sub-option usage: <ul style="list-style-type: none"> <li>• 11: Device manufacturer OUI</li> <li>• 12: Device serial number</li> <li>• 13: Device product class</li> <li>• 14: Gateway manufacturer OUI</li> <li>• 15: Gateway serial number</li> <li>• 16: Gateway product class</li> </ul> Sub-options 1-6 were used prior to TR-069 Amendment 5 |
| 17-20 | 0x00<br>11-<br>0x00<br>14 | Unassigned                         |                          |                                                                                                                                                                                                                                                                                                                                                   |
| 21    | 0x00<br>15                | Reserved                           | TR-317                   | Reserved because it's assigned as a DHCPv4 option 125 sub-option                                                                                                                                                                                                                                                                                  |
| 22-23 | 0x00<br>16-<br>0x00<br>17 | GRE tunneling                      | TR-317 Section 7.1.3.3.2 | Sub-option usage: <ul style="list-style-type: none"> <li>• 22: Server endpoint</li> <li>• 23: Client endpoint</li> </ul>                                                                                                                                                                                                                          |
| 24    | 0x00<br>18                | Reserved                           | TR-317                   | Reserved because it's assigned as a DHCPv4 option 125 sub-option                                                                                                                                                                                                                                                                                  |

|           |                |                                    |                                                    |                                                                                                                                                                                                                                                                     |
|-----------|----------------|------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25-29     | 0x0019-0x001d  | USP Controller Discovery           | <a href="#">TR-369 Discovery and Advertisement</a> | Sub-option usage: <ul style="list-style-type: none"> <li>• 25: URL of the Controller</li> <li>• 26: Provisioning code</li> <li>• 27: USP retry mini-mum wait interval</li> <li>• 28: USP retry interval multiplier</li> <li>• 29: Controller Endpoint ID</li> </ul> |
| 30-128    | 0x001e-0x0080  | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                     |
| 129-142   | 0x0081-0x008e  | <a href="#">Common Sub-options</a> | TR-156 / TR-177                                    |                                                                                                                                                                                                                                                                     |
| 143       | 0x008f         | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                     |
| 144       | 0x0090         | <a href="#">Common Sub-options</a> | TR-101 Appendix A                                  |                                                                                                                                                                                                                                                                     |
| 145-154   | 0x0091-0x009a  | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                     |
| 155-162   | 0x009b-0x00a2  | <a href="#">Common Sub-options</a> | TR-301                                             |                                                                                                                                                                                                                                                                     |
| 163-191   | 0x00a3-0x00bf  | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                     |
| 192-193   | 0x00c0-0x00c1  | <a href="#">Common Sub-options</a> | TR-301 Issue 2                                     |                                                                                                                                                                                                                                                                     |
| 194-65534 | 0x00c2-0xffffe | Unassigned                         |                                                    |                                                                                                                                                                                                                                                                     |

## 5. 5. PPPoE Tags

### PPPoE Tag 261 Sub-options

[RFC 2516](#) Appendix A: Tag 261 (0x0105): Vendor-Specific. Sub-option range: 1-254 (0x01-0xfe), 8 bits.

The following Sub-options are used with enterprise number 3561 (BBF).

| Dec | Hex | Usage | Reference | Notes |
|-----|-----|-------|-----------|-------|
|-----|-----|-------|-----------|-------|

|         |           |                           |                   |                                                |
|---------|-----------|---------------------------|-------------------|------------------------------------------------|
| 1-2     | 0x01-0x02 | Common Sub-options        | TR-156 / TR-177   |                                                |
| 3-128   | 0x03-0x80 | Unassigned                |                   |                                                |
| 129-142 | 0x81-0x8e | Common Sub-options        | TR-156 / TR-177   |                                                |
| 143     | 0x8f      | Unassigned                |                   |                                                |
| 144     | 0x90      | Common Sub-options        | TR-101 Appendix A |                                                |
| 145-154 | 0x91-0x9a | Unassigned                |                   |                                                |
| 155-162 | 0x9b-0xa2 | Common Sub-options        | TR-301            |                                                |
| 163-253 | 0xa3-0xfd | Unassigned                |                   |                                                |
| 254     | 0xfe      | PPPoA/oE IWF session flag | TR-101            | Indicates the presence of PPPoA/oE IWF session |

## 6. 6. RADIUS Attributes

### RADIUS Attribute 26 Sub-options

[RFC 2865 Section 5.26](#): Tag 26: Vendor-Specific. Sub-option range: 1-254 (0x01-0xfe), 8 bits.

The following Sub-options are used with enterprise number 3561 (BBF).

| Dec     | Hex       | Usage              | Reference         | Notes |
|---------|-----------|--------------------|-------------------|-------|
| 1-2     | 0x01-0x02 | Common Sub-options | TR-156 / TR-177   |       |
| 3-128   | 0x03-0x80 | Unassigned         |                   |       |
| 129-142 | 0x81-0x8e | Common Sub-options | TR-156 / TR-177   |       |
| 143     | 0x8f      | Unassigned         |                   |       |
| 144     | 0x90      | Common Sub-options | TR-101 Appendix A |       |
| 145-154 | 0x91-0x9a | Unassigned         |                   |       |
| 155-162 | 0x9b-0xa2 | Common Sub-options | TR-301            |       |
| 163-253 | 0xa3-0xfd | Unassigned         |                   |       |

|     |      |                           |        |                                                |
|-----|------|---------------------------|--------|------------------------------------------------|
| 254 | 0xfe | PPPoA/oE IWF session flag | TR-101 | Indicates the presence of PPPoA/oE IWF session |
|-----|------|---------------------------|--------|------------------------------------------------|

## 7. 7. IP Flow Information Export (IPFIX) Information Element Identifiers

The following IPFIX IEs are defined by BBF for use with enterprise number 3561 (BBF).

| Element ID | Name              | <a href="#">Abstract Data Type</a> | <a href="#">Data Type Semantics</a> | Status  | Description                                                                                                                                                                                                                            | <a href="#">Units</a> | Reference                      |
|------------|-------------------|------------------------------------|-------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------|
| 0          | Reserved          |                                    |                                     |         | Reserved                                                                                                                                                                                                                               |                       | <a href="#">TR-352 Issue 2</a> |
| 1          | ng2sys-id         | unsigned32                         | identifier                          | current | G.989.3 NG2Sys ID (20 bits)                                                                                                                                                                                                            | none                  | <a href="#">TR-352 Issue 2</a> |
| 2          | src-ct-id         | unsigned32                         | identifier                          | current | The identifier of the individual CT issuing the ICTP message, represented by the TC layer PON-ID of the sender CT. For PON-ID definition, see Clause 6.1.5.3 of ITU-T G.989 [2] and Clause C.6.1.5.3 of G.9807.1 [6].                  | none                  | <a href="#">TR-352 Issue 2</a> |
| 3          | dst-ct-id         | unsigned32                         | identifier                          | current | The DST-CT-ID is the identifier of the individual CT receiving the ICTP message represented by the TC layer PON-ID of recipient CT. For PON-ID definition, see Clause 6.1.5.3 of ITU-T G.989 [2] and Clause C.6.1.5.3 of G.9807.1 [6]. | none                  | <a href="#">TR-352 Issue 2</a> |
| 4          | onu-identifier    | unsigned16                         | identifier                          | current | G.989.3 Clause 6.1.5.6 defines the ONU-ID as a 10-bit identifier                                                                                                                                                                       | none                  | <a href="#">TR-352 Issue 2</a> |
| 5          | onu-serial-number | unsigned64                         | default                             | current | G.989.3 Clause 11.2.6.1 ONU Serial Number. It is comprised of Vendor-ID (4 bytes) and the VSSN (4-byte unsigned integer)                                                                                                               | none                  | <a href="#">TR-352 Issue 2</a> |

|    |                          |              |            |         |                                                                                                                                                                                   |      |                                |
|----|--------------------------|--------------|------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|
| 6  | xgem-port-id             | unsigned16   | identifier | current | G.989.3 Clause 6.1.5.8 defines the XGEM Port-ID as a 16-bit integer                                                                                                               | none | <a href="#">TR-352 Issue 2</a> |
| 7  | ipv4-address-gateway     | ipv4 Address | default    | current | The IPv4 Access Router Gateway address.                                                                                                                                           | none | <a href="#">TR-352 Issue 2</a> |
| 8  | ipv6-address-gateway     | ipv6 Address | default    | current | The IPv6 Access Router Gateway address.                                                                                                                                           | none | <a href="#">TR-352 Issue 2</a> |
| 9  | dhcpv4-server            | ipv4 Address | default    | current | DHCPv4 Server Address                                                                                                                                                             | none | <a href="#">TR-352 Issue 2</a> |
| 10 | dhcpv6-server            | ipv6 Address | default    | current | DHCPv6 Server Address                                                                                                                                                             | none | <a href="#">TR-352 Issue 2</a> |
| 11 | expiration               | unsigned32   | default    | current | DHCP Expiry (seconds)                                                                                                                                                             | none | <a href="#">TR-352 Issue 2</a> |
| 12 | is-static                | boolean      | default    | current | Is static address                                                                                                                                                                 | none | <a href="#">TR-352 Issue 2</a> |
| 13 | pppoe-session-identifier | unsigned16   | identifier | current | RFC 2516 defines the session ID for Discovery packets. The value is fixed for a given PPP session. The Ethernet Source and Destination Address uniquely identify a PPPoE session. | none | <a href="#">TR-352 Issue 2</a> |

|    |                             |                 |         |         |                                                                                                                                                                                                                                                                                                                            |         |                                                   |
|----|-----------------------------|-----------------|---------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------|
| 14 | client-mac-address          | mac Address     | default | current | Subscriber MAC address for this flow                                                                                                                                                                                                                                                                                       | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 15 | bras-mac-address            | mac Address     | default | current | BRAS MAC address for this flow.                                                                                                                                                                                                                                                                                            | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 16 | sflag                       | unsigned16      | default | current | Session status flag bitmaps: <ul style="list-style-type: none"> <li>• Bit 0: indicates that BNG sent a PPP_MAX_PAYLOAD tag</li> <li>• Bit 1: indicates that the inactivity timer is pending</li> <li>• Bit 2: indicates that the IWF timer is pending</li> <li>• Bit 3: indicates not to send PADT on terminate</li> </ul> | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 17 | birthtime                   | dateTimeSeconds | default | current | Birth Time for the PPPoE Session                                                                                                                                                                                                                                                                                           | seconds | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 18 | querier-source-ipv4-address | ipv4 Address    | default | current | The Querier IPv4 source address                                                                                                                                                                                                                                                                                            | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 19 | querier-source-ipv6-address | ipv6 Address    | default | current | The Querier IPv6 source address                                                                                                                                                                                                                                                                                            | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 20 | querier-uptime              | dateTimeSeconds |         | current | The time since mgmdRouterInterfaceQuerier was last changed                                                                                                                                                                                                                                                                 | seconds | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 21 | host-reporter-ipv4-address  | ipv4 Address    | default | current | The host reporter IPv4 source address                                                                                                                                                                                                                                                                                      | none    | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |

|    |                            |              |         |         |                                       |      |                                |
|----|----------------------------|--------------|---------|---------|---------------------------------------|------|--------------------------------|
| 22 | host-reporter-ipv6-address | ipv6 Address | default | current | The host reporter IPv6 source address | none | <a href="#">TR-352 Issue 2</a> |
| 23 | group-ipv4-address         | ipv4 Address | default | current | The multicast group address           | none | <a href="#">TR-352 Issue 2</a> |
| 24 | group-ipv6-address         | ipv6 Address | default | current | The multicast group address           | none | <a href="#">TR-352 Issue 2</a> |
| 25 | entity-class               | unsigned16   | default | current | G.988 Entity Class                    | none | <a href="#">TR-352 Issue 2</a> |
| 26 | entity-instance            | unsigned16   | default | current | G.988 Entity Instance                 | none | <a href="#">TR-352 Issue 2</a> |
| 27 | attribute-mask             | unsigned16   | default | current | G.988 Attribute Mask                  | none | <a href="#">TR-352 Issue 2</a> |
| 28 | attribute-values           | octetArray   | default | current | G.988 Attribute Value                 | none | <a href="#">TR-352 Issue 2</a> |
| 29 | table-entity-class         | unsigned16   | default | current | G.988 Entity Class                    | none | <a href="#">TR-352 Issue 2</a> |

|                              |                               |                    |             |                                 |                           |              |                                                   |
|------------------------------|-------------------------------|--------------------|-------------|---------------------------------|---------------------------|--------------|---------------------------------------------------|
| 30                           | table-<br>entity-<br>instance | unsi<br>gne<br>d16 | defa<br>ult | c<br>u<br>r<br>r<br>e<br>n<br>t | G.988 Entity Instance     | n<br>o<br>ne | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 31                           | table-<br>attribut<br>e-mask  | unsi<br>gne<br>d16 | defa<br>ult | c<br>u<br>r<br>r<br>e<br>n<br>t | G.988 Attribute Mask      | n<br>o<br>ne | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 32                           | array-<br>tablero<br>ws       | octe<br>tArr<br>ay | defa<br>ult | c<br>u<br>r<br>r<br>e<br>n<br>t | G.988 Array of Table Rows | n<br>o<br>ne | <a href="#">TR-352</a><br><a href="#">Issue 2</a> |
| 3<br>3-<br>3<br>2<br>7<br>67 | Unassi<br>gned                |                    |             |                                 |                           |              |                                                   |

## 8. 8. Packet Forwarding Control Protocol (PFCP) Information Element (IE) Extensions

The Broadband Forum (BBF) Enterprise Number is 3561 decimal (0x0DE9) and is listed in the [IANA Private Enterprise Numbers Registry](#).

PFCP IEs extended by BBF follow the 3GPP TS 29.244 specified format of vendor-specific IEs.

| Type Identifier | Name | Reference(s) | Notes |
|-----------------|------|--------------|-------|
|-----------------|------|--------------|-------|

|       |                           |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------|---------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32768 | BBF UP Function Features  | TR-459, TR-459.2, TR-459.3, TR-459 Issue 2 | <p>Supported UP Features:</p> <p>Bit 7/1: PPPoE (459)</p> <p>Bit 7/2: IPoE (459)</p> <p>Bit 7/3: LAC (459)</p> <p>Bit 7/4: LNS (459)</p> <p>Bit 7/5: LCP keepalive offload (459)</p> <p>Bit 7/6: IPTV (459.3)</p> <p>Bit 7/7: NAT-CP (459.2)</p> <p>Bit 7/8: NAT-UP (459.2)</p> <p>Bit 8/1: Issue 2 Minimum Feature Set (459i2)</p> <p>Bit 8/2: Volume quota and thresholds (459i2)</p> <p>Bit 8/3: ACL (459i2)</p> <p>Bit 8/4: Server Control Packet Redirection (459i2)</p> |
| 32769 | Logical Port              | TR-459                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 32770 | BBF Outer Header Creation | TR-459                                     | <p>Supported Outer Headers:</p> <p>Bit 1: CPR-NSH</p> <p>Bit 2: Traffic-Endpoint</p> <p>Bit 3: L2TP</p> <p>Bit 4: PPP</p>                                                                                                                                                                                                                                                                                                                                                     |
| 32771 | BBF Outer Header Removal  | TR-459                                     | <p>Supported Outer Removals:</p> <p>Value 1: Ethernet</p> <p>Value 2: PPPoE/Ethernet</p> <p>Value 3: PPP/PPPoE/Ethernet</p> <p>Value 4: L2TP</p> <p>Value 5: PPP/L2TP</p>                                                                                                                                                                                                                                                                                                     |
| 32772 | PPPoE Session ID          | TR-459                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 32773 | PPP protocol              | TR-459                                     | <p>Supported Flags:</p> <p>Bit 1: Specific</p> <p>Bit 2: Data</p> <p>Bit 3: Control</p>                                                                                                                                                                                                                                                                                                                                                                                       |

|       |                                  |                          |                                                                                       |
|-------|----------------------------------|--------------------------|---------------------------------------------------------------------------------------|
| 32774 | Verification Timers              | TR-459                   |                                                                                       |
| 32775 | PPP LCP Magic Number             | TR-459                   |                                                                                       |
| 32776 | MTU                              | TR-459                   |                                                                                       |
| 32777 | L2TP Tunnel Endpoint             | TR-459                   |                                                                                       |
| 32778 | L2TP Session ID                  | TR-459                   |                                                                                       |
| 32779 | L2TP Type                        | TR-459                   |                                                                                       |
| 32780 | PPP LCP Connectivity             | TR-459                   |                                                                                       |
| 32781 | L2TP Tunnel                      | TR-459                   |                                                                                       |
| 32782 | BBF Multicast Flags              | TR-459.3                 | Supported Flags:<br><br>Bit 1: Fast Leave<br><br>Bit 2: Router Alert Off              |
| 32783 | BBF Multicast Query Parameters   | TR-459.3                 |                                                                                       |
| 32784 | BBF Multicast Group Limit        | TR-459.3                 |                                                                                       |
| 32785 | BBF Multicast Protocol Control   | TR-459.3                 |                                                                                       |
| 32787 | BBF Apply Action                 | TR-459.2, TR-459 Issue 2 | Supported Actions:<br><br>Bit 1: NAT (459.2)<br><br>Bit 2: Reply-To-Request (459i2)   |
| 32788 | BBF NAT External Port Range      | TR-459.2                 |                                                                                       |
| 23789 | BBF NAT Port Forward             | TR-459.2                 |                                                                                       |
| 23790 | BBF Report Trigger               | TR-459.2                 | Supported Triggers:<br><br>Value 1: DBNG-UP allocated NAT blocks needs to be reported |
| 32791 | BBF Dynamic NAT Block Port Range | TR-459.2                 |                                                                                       |
| 32792 | BBF Event Time Stamp             | TR-459.2                 |                                                                                       |

|       |                              |                |                                                                                            |
|-------|------------------------------|----------------|--------------------------------------------------------------------------------------------|
| 32793 | BBF-node-info-create         | TR-459 Issue 2 |                                                                                            |
| 32794 | BBF-node-info-modify         | TR-459 Issue 2 |                                                                                            |
| 32795 | BBF-node-info-delete         | TR-459 Issue 2 |                                                                                            |
| 32796 | BBF Logical Port Report      | TR-459 Issue 2 |                                                                                            |
| 32797 | BBF SGRP Notification Report | TR-459 Issue 2 |                                                                                            |
| 32798 | BBF Network Instance Report  | TR-459 Issue 2 |                                                                                            |
| 32799 | BBF SGRP Error               | TR-459 Issue 2 |                                                                                            |
| 32800 | BBF SGRP                     | TR-459 Issue 2 |                                                                                            |
| 32801 | BBF UP Subscriber Prefix     | TR-459 Issue 2 |                                                                                            |
| 32819 | BBF Prefix Error             | TR-459 Issue 2 |                                                                                            |
| 32802 | BBF ACL                      | TR-459 Issue 2 |                                                                                            |
| 32803 | BBF Direction                | TR-459 Issue 2 | Value 0 - Input/Ingress/Upstream direction<br>Value 1 - Output/Egress/Downstream direction |
| 32804 | BBF Family                   | TR-459 Issue 2 | Value 0 - IPv4<br>Value 1 - IPv4<br>Value 2 - IPv46<br>Value 3 - L2eth                     |
| 32806 | BBF SGRP Identifier          | TR-459 Issue 2 |                                                                                            |
| 32807 | BBF SGRP State               | TR-459 Issue 2 | Value 0 - reserved<br>Value 1 - Active<br>Value 2 - Backup<br>Value 3 - Track-Logical-Port |
| 32808 | BBF SGRP Flags               | TR-459 Issue 2 | Bit 1 : Router Advertisement State<br>Bit 2 : Partial State Allowed                        |

|       |                           |                |                                                                                                     |
|-------|---------------------------|----------------|-----------------------------------------------------------------------------------------------------|
| 32809 | BBF Operational Condition | TR-459 Issue 2 | Value 0 - Up<br>Value 1 - Down<br>Value 2 - Not-ready<br>Value 3 - Up-active<br>Value 4 - Up-backup |
| 32810 | BBF IPv4 Prefix           | TR-459 Issue 2 |                                                                                                     |
| 32811 | BBF IPv6 Prefix           | TR-459 Issue 2 |                                                                                                     |
| 32812 | BBF Prefix Tag            | TR-459 Issue 2 |                                                                                                     |

|       |                              |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------|------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32813 | BBF Error Code               | TR-459 Issue 2 | <p>Values:</p> <p>0x0: Reserved</p> <p>0x1: SGRP programming error because of resource exhaustion</p> <p>0x2: SGRP programming error because of configuration mismatch or incomplete</p> <p>0x3: SGRP programming error related to vMAC</p> <p>0x4: SGRP Partial state is not supported on DBNG-UP</p> <p>0x5: SGRP Track logical port is not supported by DBNG-UP on the Logical ports specified for this SGRP</p> <p>0x6: ACL name not found</p> <p>0x7: Prefix programming error because of resource exhaustion</p> <p>0x8: Prefix programming error because of configuration mismatch or incomplete</p> <p>0x9: Prefix's Network Instance not found</p> <p>0xA: Prefix Active Tag matching not found</p> <p>0xB: Prefix Backup Tag matching not found</p> <p>0xC: Prefix's SGRP ID not found</p> <p>0xD Prefix not found (on prefix modify or prefix delete)</p> <p>0xE Prefix in use (when SGRP delete is performed before prefix delete)</p> <p>0xF SGRP programming error because of ongoing SGRP deletion</p> <p>0xFFFF Other error</p> |
| 32814 | BBF Error Message            | TR-459 Issue 2 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 32815 | BBF Maximum ACL Chain Length | TR-459 Issue 2 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 32816 | BBF Forwarding Capacity      | TR-459 Issue 2 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|       |                                    |                |                                                                                                   |
|-------|------------------------------------|----------------|---------------------------------------------------------------------------------------------------|
| 32817 | BBF Connectivity Status            | TR-459 Issue 2 | Value 0 - Reserved<br>Value 1 - Connected<br>Value 2 - Isolated                                   |
| 32818 | Vendor-specific Node Report Type   | TR-459 Issue 2 | Bit 1 - Logical Port Report<br>Bit 2 - Subscriber Group Report<br>Bit 3 - Network Instance Report |
| 32820 | BBF C-Tag Range                    | TR-459 Issue 2 |                                                                                                   |
| 32821 | BBF S-Tag Range                    | TR-459 Issue 2 |                                                                                                   |
| 32822 | BBF 5WE Session ID                 | TR-458         |                                                                                                   |
| 32823 | BBF Traffic Enforcement Type       | TR-458         |                                                                                                   |
| 32824 | BBF PCP                            | TR-458         |                                                                                                   |
| 32825 | BBF TC Name                        | TR-458         |                                                                                                   |
| 32826 | BBF PBS                            | TR-458         | Bit 1 - Uplink PBS<br>Bit 2 - Downlink PBS                                                        |
| 32827 | BBF CBS                            | TR-458         | Bit 1 - Uplink CBS<br>Bit 2 - Downlink CBS                                                        |
| 32828 | BBF CIRmax                         | TR-458         | Bit 1 - Uplink CIR max<br>Bit 2 - Downlink CIR max                                                |
| 32829 | BBF Parent QER ID                  | TR-458         |                                                                                                   |
| 32830 | BBF QoS Profile Name               | TR-458         |                                                                                                   |
| 32832 | BBF UL Policing Descriptor Name    | TR-458         |                                                                                                   |
| 32833 | BBF DL Policing Descriptor Name    | TR-458         |                                                                                                   |
| 32834 | BBF UL TC Policing Descriptor Name | TR-458         |                                                                                                   |
| 32835 | BBF DL TC Policing Descriptor Name | TR-458         |                                                                                                   |

|       |                              |        |  |
|-------|------------------------------|--------|--|
| 32836 | BBF DL<br>Descriptor Name    | TR-458 |  |
| 32837 | BBF DL TC<br>Descriptor Name | TR-458 |  |