

TR-355

YANG Modules for FTTdp Management

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| 1 Amendment 3 | 13 October 2020 | 13 October 2020 | Joey Boyd, ADTRAN Ken Kerpez, ASSIA | Add support for bonding as defined in ITU-T G.998.1, G.998.2, G.998.3 and BBF TR-159. Add alarming support for FAST and VDSL. Add support for additions and changes from amendments to ITU G.997.1 and G.997.2. |

Comments or questions about this Broadband Forum Technical Report should be directed to info@broadband-forum.org.

| | | |
|--|------------------------|--------|
| Editors | Joey Boyd | ADTRAN |
| | Ken Kerpez | ASSIA |
| YANG Modules Project Stream Leaders | Joey Boyd | ADTRAN |
| | Sowrirajan Padmanabhan | Nokia |
| Common YANG Work Area Directors | Sven Ooghe | Nokia |
| | Joey Boyd | ADTRAN |

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Executive Summary

This Technical Report defines YANG data models for the management interfaces to support FTTdp. These models are to enable interoperability for FTTdp management.

1 Purpose and Scope

1.1 Purpose

This Technical Report defines YANG data models for the management interfaces to support FTTdp. These models are to enable interoperability for FTTdp management.

1.2 Scope

This Technical Report currently defines the following interface-related YANG modules:

- bbf-fastdsl: An interface object supporting xDSL and G.fast.
- bbf-ghs: Includes standardized parameters to startup (“handshake”) G.fast or VDSL.
- bbf-fast: Includes all standardized parameters for G.fast configuration, status monitoring, performance management, testing and diagnostics.
- bbf-vdsl: Includes all standardized parameters for VDSL2 configuration, status monitoring, performance management, testing and diagnostics.
- bbf-selt: Includes all standardized parameters for configuration and test results of Single-Ended Line Test (SELT).
- bbf-melt: Includes all standardized parameters for configuration and test results of Metallic Line Test (MELT).
- bbf-hardware-rpf-dpu: Includes all standardized parameters for Reverse Power Feeding (RPF) configuration, status monitoring and event notifications.
- bbf-gbond: Includes all standardized parameters for managing physically bonded access lines.

The YANG modules of TR-355 are posted on GitHub at <https://github.com/BroadbandForum/yang>. This Technical Report documents the theory of operation and organization of these YANG modules and contains high-level descriptions and pointers to more detailed documentation in the YANG files.

Section 4 of this document briefly outlines the modules defined in TR-355. Section 5 describes the documentation included in the modules in TR-355.

2 References and Terminology

2.1 Conventions

In this Technical Report, several words are used to signify the requirements of the specification. These words are always capitalized. More information can be found in RFC 2119 [7].

| | |
|-------------------|---|
| MUST | This word, or the term “REQUIRED”, means that the definition is an absolute requirement of the specification. |
| MUST NOT | This phrase means that the definition is an absolute prohibition of the specification. |
| SHOULD | This word, or the term “RECOMMENDED”, means that there could exist valid reasons in particular circumstances to ignore this item, but the full implications need to be understood and carefully weighed before choosing a different course. |
| SHOULD NOT | This phrase, or the phrase "NOT RECOMMENDED" means that there could exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications need to be understood and the case carefully weighed before implementing any behavior described with this label. |
| MAY | This word, or the term “OPTIONAL”, means that this item is one of an allowed set of alternatives. An implementation that does not include this option MUST be prepared to inter-operate with another implementation that does include the option. |

2.2 References

The following references are of relevance to this Technical Report. At the time of publication, the editions indicated were valid. All references are subject to revision; users of this Technical Report are therefore encouraged to investigate the possibility of applying the most recent edition of the references listed below.

A list of currently valid Broadband Forum Technical Reports is published at www.broadband-forum.org.

| Document | Title | Source | Year |
|--------------------------------|---|--------|------|
| [1] TR-159 | Management Framework for xDSL Bonding | BBF | 2008 |
| [2] TR-252i3 | <i>xDSL Protocol-Independent Management Model</i> | BBF | 2013 |
| [3] TR-298i2 | <i>Management model for DSL line test</i> | BBF | 2017 |
| [4] TR-301i2c1 | <i>Architecture and Requirements for Fiber to</i> | BBF | 2019 |

| Document | Title | Source | Year |
|-------------------------------|--|--------|------|
| | <i>the Distribution Point</i> | | |
| [5] TR-371 | <i>G.fast Vector of Profiles (VoP) Managed Object Structure</i> | BBF | 2016 |
| [6] TR-383 | <i>Common YANG Modules for Access Networks</i> | BBF | 2020 |
| [7] RFC 2119 | <i>Key words for use in RFCs to Indicate Requirement Levels</i> | IETF | 1997 |
| [8] RFC 6991 | <i>Common YANG Data Types</i> | IETF | 2013 |
| [9] RFC 7223 | <i>A YANG Data Model for Interface Management</i> | IETF | 2014 |
| [10] RFC 7224 | <i>IANA Interface Type YANG Module</i> | IETF | 2014 |
| [11] RFC 7950 | <i>The YANG 1.1 Data Modeling Language</i> | IETF | 2016 |
| [12] RFC 8342 | <i>Network Management Datastore Architecture</i> | IETF | 2018 |
| [13] RFC 8348 | <i>A YANG Data Model for Hardware Management</i> | IETF | 2018 |
| [14] G.993.2 | <i>Very high digital subscriber line transceivers 2 (VDSL2)</i> | ITU-T | 2019 |
| [15] G.994.1 | <i>Handshake procedures for digital subscriber line (DSL) transceivers</i> | ITU-T | 2012 |
| [16] G.996.2 | <i>Single-ended line testing for digital subscriber lines (DSL)</i> | ITU-T | 2018 |
| [17] G.997.1 | <i>Physical layer management for digital subscriber line (DSL) transceivers</i> | ITU-T | 2019 |
| [18] G.997.2 | <i>Physical layer management for G.fast transceivers</i> | ITU-T | 2020 |
| [19] G.998.1 | <i>ATM-based multipair bonding</i> | ITU-T | 2013 |
| [20] G.998.2 | <i>Ethernet-based multipair bonding</i> | ITU-T | 2018 |
| [21] G.998.3 | <i>Multi-pair bonding using time-division inverse multiplexing</i> | ITU-T | 2013 |
| [22] G.9700 | <i>Fast access to subscriber terminals (G.fast) – Power spectral density specification</i> | ITU-T | 2019 |
| [23] G.9701 | <i>Fast access to user terminals (FAST) - Physical layer specification</i> | ITU-T | 2019 |

2.3 Definitions

The following terminology is used throughout this Technical Report.

| | |
|--------------|--|
| DP | Distribution Point. The location in the Fiber To The Distribution Point architecture that provides the distribution of user traffic from fiber backhaul to copper drop points. |
| DPU | Distribution Point Unit. The node that resides at the DP in the Fiber To The Distribution Point architecture. |
| FTTdp | Fiber To The Distribution Point. |
| PMA | Persistent Management Agent. A management proxy for the DPU that caches provisioning and last known status information for the DPU. |

2.4 Abbreviations

This Technical Report uses the following abbreviations:

| | |
|------|-------------------------------------|
| FAST | Fast Access To Subscriber Terminals |
| MELT | Metallic Line Test |
| RPF | Reverse Power Feed |
| SELT | Single Ended Line Test |
| VoP | Vector of Profiles |
| xDSL | Any Digital Subscriber Line Service |

3 Technical Report Impact

3.1 Energy Efficiency

TR-355 has no impact on energy efficiency.

3.2 IPv6

TR-355 has no impact on IPv6.

3.3 Security

TR-355 has no impact on security.

3.4 Privacy

Any issues regarding privacy are not affected by TR-355.

4 Modules

The YANG modules contained in TR-355 are briefly described here. The figure below provides a high level view of the functionality covered by this Technical Report (BBF YANG in green):

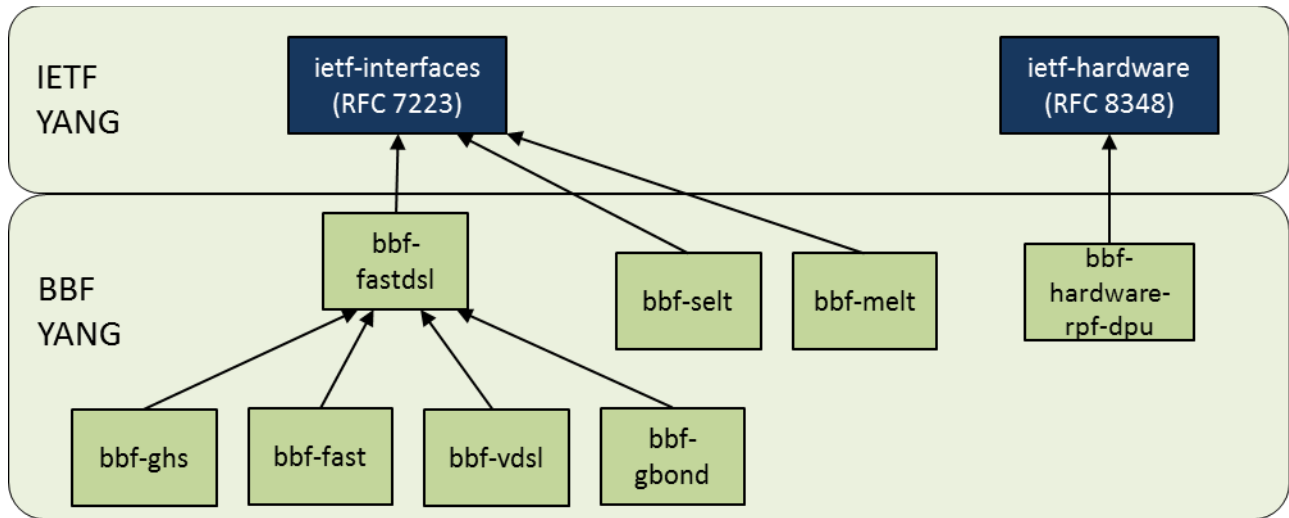


Figure 1 – YANG Data Model Relationships

4.1 FastDSL

There is one module used to manage common FAST and xDSL. This module can be found in the *interface* directory on GitHub.

4.1.1 bbf-fastdsl.yang

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of interfaces which support one or more DSL or G.fast technologies. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

4.2 Ghs

There is one module, containing 4 submodules, which is used to manage handshake as defined in ITU-T G.994.1 [15]. The module and submodules can be found in the *interface* directory in GitHub.

4.2.1 bbf-ghs

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of interfaces which support one or more DSL or G.fast technologies.

As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Submodules:

- bbf-ghs-base
- bbf-ghs-pointers
- bbf-ghs-handshake-profiles
- bbf-ghs-handshake-profile-body

4.3 FAST

There are two modules and thirty-six submodules which are used to manage FAST interfaces. These can be found in the *interface* directory in GitHub.

4.3.1 bbf-fast

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of G.fast interfaces as defined in ITU-T G.9700 [22], ITU-T G.9701 [23], ITU-T G.997.2 [18] and BBF TR-371 [5]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Submodules:

- bbf-fast-availability
- bbf-fast-base
- bbf-fast-channel-performance-body
- bbf-fast-channel-status-body
- bbf-fast-channel-threshold-profile-body
- bbf-fast-data-rate-profile-body
- bbf-fast-fast-rate-adaptation-profile-body
- bbf-fast-fast-retrain-policy-profile-body
- bbf-fast-ftu-inventory-body
- bbf-fast-impulse-noise-monitoring-profile-body
- bbf-fast-inventory
- bbf-fast-line-spectrum-profile-body
- bbf-fast-line-performance-body
- bbf-fast-line-status-body
- bbf-fast-line-threshold-profile-body
- bbf-fast-link-state-body
- bbf-fast-noise-margin-profile-body
- bbf-fast-pointers
- bbf-fast-perf-types
- bbf-fast-performance-management
- bbf-fast-quality-profiles
- bbf-fast-read-test-body

- bbf-fast-retransmission-profile-body
- bbf-fast-rfi-profile-body
- bbf-fast-service-profiles
- bbf-fast-spectrum-profiles
- bbf-fast-status-monitoring
- bbf-fast-tdd-profiles
- bbf-fast-tdd-profile-body
- bbf-fast-test-diagnostics
- bbf-fast-test-mode-body
- bbf-fast-threshold-crossing-alert-body
- bbf-fast-threshold-management
- bbf-fast-update-test-body
- bbf-fast-upstream-power-back-off-profile-body
- bbf-fast-vectoring-profile-body

4.3.2 bbf-fast-alarm-types

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of G.fast interfaces as defined in ITU-T G.9700 [22], ITU-T G.9701 [23], ITU-T G.997.2 [18] and BBF TR-371 [5]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Specifically, this module contains a set of alarm definitions related to FAST interfaces.

4.4 VDSL

There are two modules and forty submodules which are used to manage VDSL interfaces. These can be found in the *interface* directory in GitHub.

4.4.1 bbf-vdsl

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Very High-speed Digital Subscriber Line (VDSL) interfaces as defined in ITU-T G.993.2 [14], ITU-T G.997.1 [17] and BBF TR-252 [2]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Submodules:

- bbf-vdsl-availability.yang
- bbf-vdsl-base-body.yang
- bbf-vdsl-base.yang
- bbf-vdsl-data-gathering-profile-body.yang
- bbf-vdsl-data-rate-profile-body.yang
- bbf-vdsl-downstream-power-back-off-profile-body.yang
- bbf-vdsl-impulse-noise-monitoring-profile-body.yang

- bbf-vdsl-impulse-noise-protection-delay-profile-body.yang
- bbf-vdsl-inventory-body.yang
- bbf-vdsl-line-spectrum-profile-body.yang
- bbf-vdsl-line-status-body.yang
- bbf-vdsl-line.yang
- bbf-vdsl-mode-specific-psd-profile-body.yang
- bbf-vdsl-noise-margin-profile-body.yang
- bbf-vdsl-performance-management.yang
- bbf-vdsl-pointers.yang
- bbf-vdsl-quality-profiles.yang
- bbf-vdsl-radio-frequency-interference-profile-body.yang
- bbf-vdsl-re-initialization-policy-profile-body.yang
- bbf-vdsl-service-profiles.yang
- bbf-vdsl-sos-profile-body.yang
- bbf-vdsl-spectrum-profiles.yang
- bbf-vdsl-status-monitoring.yang
- bbf-vdsl-test-diagnostics.yang
- bbf-vdsl-test-mode-body.yang
- bbf-vdsl-threshold-crossing-alert-body.yang
- bbf-vdsl-threshold-management.yang
- bbf-vdsl-upstream-power-back-off-profile-body.yang
- bbf-vdsl-vectoring-profile-body.yang
- bbf-vdsl-virtual-noise-profile-body.yang
- bbf-vdsl-xtu-band-status-body.yang
- bbf-vdsl-xtu-channel-performance-body.yang
- bbf-vdsl-xtu-channel-status-body.yang
- bbf-vdsl-xtu-channel-threshold-profile-body.yang
- bbf-vdsl-xtu-data-gathering-report-body.yang
- bbf-vdsl-xtu-line-performance-body.yang
- bbf-vdsl-xtu-line-status-body.yang
- bbf-vdsl-xtu-line-threshold-profile-body.yang
- bbf-vdsl-xtu-sub-carrier-status-body.yang
- bbf-vdsl-xtu.yang

4.4.2 bbf-vdsl-alarms

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Very High-speed Digital Subscriber Line (VDSL) interfaces as defined in G.993.2 [14], ITU-T G.997.1 [17] and BBF TR-252 [2]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Specifically, this module contains a set of alarm definitions related to VDSL interfaces.

4.5 SELT

There is one module and twelve submodules which are used to manage Single Ended Line Text (SELT) functionality. These can be found in the *interface* directory in GitHub.

4.5.1 bbf-selt

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Single Ended Line Test (SELT) as defined in ITU-T G.996.2 [16] and BBF TR-298 [3]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Submodules:

- bbf-selt-base.yang
- bbf-selt-pmd-control-body.yang
- bbf-selt-pmd-measurement-parameter-body.yang
- bbf-selt-pmd-profile-body.yang
- bbf-selt-pmd-profiles.yang
- bbf-selt-pmd-status-body.yang
- bbf-selt-pmd.yang
- bbf-selt-pointers.yang
- bbf-selt-processing-derived-parameter-body.yang
- bbf-selt-processing-profile-body.yang
- bbf-selt-processing-profiles.yang
- bbf-selt-result-parameters.yang

4.6 MELT

There is one module and thirteen submodules which are used to manage Metallic Line Text (MELT) functionality. These can be found in the *interface* directory in GitHub.

4.6.1 bbf-melt

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Metallic Line Test (MELT) as defined in ITU-T G.996.2 [16] and BBF TR-298 [3]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Submodules:

- bbf-melt-base.yang
- bbf-melt-pmd-control-body.yang
- bbf-melt-pmd-measurement-parameter-body.yang
- bbf-melt-pmd-profile-body.yang
- bbf-melt-pmd-profiles.yang
- bbf-melt-pmd-reporting-parameter-body.yang

- bbf-melt-pmd-status-body.yang
- bbf-melt-pmd.yang
- bbf-melt-pointers.yang
- bbf-melt-processing-derived-parameter-body.yang
- bbf-melt-processing-profile-body.yang
- bbf-melt-processing-profiles.yang
- bbf-melt-result-parameters.yang

4.7 Reverse Power Feeding (RPF)

There three modules which are used to manage Reverse Power Feeding (RPF) functionality. These can be found in the *equipment* directory in GitHub.

4.7.1 bbf-hardware-rpf-dpu

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Reverse Power Feeding (RPF) as defined in ITU G.997.2 Annex A [18] and BBF TR-159 [1]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

4.7.2 bbf-hardware-rpf-dpu-state

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Reverse Power Feeding (RPF) as defined in ITU G.997.2 Annex A [18] and BBF TR-159 [1]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Specifically, this module is to be used when the server does not support Network Management Datastore Architecture (NMDA) as defined in RFC 8342 [12].

4.7.3 bbf-hardware-rpf-dpu-alarms

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on management of Reverse Power Feeding (RPF) as defined in ITU G.997.2 Annex A [18] and BBF TR-159 [1]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Specifically, this module contains a set of alarm definitions related to RPF functionality.

4.8 Bonding

There are two modules which are used to manage the bonding of multiple FAST or VDSL interfaces. These can be found in the *interface* directory in GitHub.

4.8.1 bbf-gbond

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on bonding of physical interfaces as defined in ITU-T G.998.1 [19], ITU-T G.998.2 [20], ITU-T G.998.3 [21] and BBF TR-159 [1]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

4.8.2 bbf-gbond-state

This module contains a collection of YANG definitions for supporting the Broadband Forum requirements on bonding of physical interfaces as defined in ITU-T G.998.1 [19], ITU-T G.998.2 [20], ITU-T G.998.3 [21] and BBF TR-159 [1]. As such, this module is specific to access network equipment (e.g., BBF-specified Access Nodes and FTTdp DPUs).

Specifically, this module is to be used when the server does not support Network Management Datastore Architecture (NMDA) as defined in RFC 8342 [12].

5 Documentation

There are “README.md” files; these are short text files giving brief descriptions of the contents of the directories they are in.

Documentation for the bbf-fast module is contained in directory *interface/docs* and has filenames beginning with bbf-fast. The tree files show the structure of the module. The tree files named bbf-fast.x.tree show the tree structure down to depth “x,” and bbf-fast.tree shows the structure and all parameters in the entire module. Tree files named bbf-fast-xxx.tree show the tree of submodule “xxx.”

Documentation for the bbf-vdsl module is contained in directory *interface/docs* and has filenames beginning with bbf-vdsl. The tree files here show the structure of the module. Tree files named bbf-vdsl.x.tree show the tree structure down to depth “x,” and bbf-vdsl.tree shows the structure and all parameters in the entire module. Tree files named bbf-vdsl-xxx.tree show the tree of submodule “xxx.”

Documentation for the bbf-selt module is contained in directory *interface/docs* and has filenames beginning with bbf-selt. The tree files here show the structure of the module. Tree files named bbf-selt.x.tree show the tree structure down to depth “x.”

Documentation for the bbf-melt module is contained in directory *interface/docs* and has filenames beginning with bbf-melt. The tree files here show the structure of the module. Tree files named bbf-melt.x.tree show the tree structure down to depth “x.”

Documentation for the bbf-hardware-rpf-dpu module is contained in directory *equipment/docs* and has filenames beginning with bbf-hardware-rpf-dpu. The tree files here show the structure of the module. Tree files named bbf-hardware-rpf-dpu.x.tree show the tree structure down to depth “x.”

Documentation for the bbf-gbond module is contained in directory *interface/docs* and has filenames beginning with bbf-gbond. The tree files here show the structure of the module. Tree files named bbf-gbond.x.tree show the tree structure down to depth “x.”

6 Dependencies on Related YANG modules and Standards

TR-355 is based on YANG 1.1 (RFC 7950 [11]).

The following YANG modules are used by TR-355:

- bbf-alarm-types [6]
- bbf-hardware-types [6]
- bbf-yang-types [6]
- iana-if-type [10]
- ietf-hardware [13]
- ietf-interfaces.yang [9]
- ietf-yang-types.yang [10]

7 DPU/PMA Behavior

The requirements in this section only apply to DPUs and PMAs that comply with TR-301 [4]

The following describes the behavior of objects on a DPU with respect to FAST and VDSL configuration and state data objects.

- On initial startup, the DPU MUST instantiate a FastDSL object for each FastDSL-capable port supported by non-removable hardware.
- The DPU MUST NOT instantiate FastDSL objects for ports supported by removable hardware.
- The PMA MUST instantiate FastDSL objects for ports supported by removable hardware.
- The DPU notifies the PMA of the insertion of removable hardware.
- FAST and VDSL configuration objects (associated with the FastDSL object) are configured by the PMA.
- The PMA will configure the FastDSL object for FAST and/or VDSL mode (configuring both modes implicitly means G.hs is used to determine the operational mode).
- If the PMA configures the FastDSL object for a mode not supported by the DPU, the DPU sets the appropriate availability status and either the issue tag "configured-mode-fast-not-supported" or "configured-mode-vdsl-not-supported".
- When the handshake completes with the selection of FAST or VDSL, the corresponding state object will be created (if not yet existing).
- When the technology changes through handshake, the old state object will be deleted and the new one will be created. There will therefore never be more than one state object (and until the first handshake completes there will be none).

Devices are expected to use YANG deviations to announce capabilities, such as the maximum number of supported profiles. Rules and guidelines for this are expected to be defined in future document(s).

8 YANG Modules Supported by a DPU

Table 1 specifies the DPU YANG modules to be supported by DPU Model 2:

Table 1. YANG modules to be supported by a DPU Model 2

| Module reference | Document reference | Support by DPU |
|-------------------------|--------------------|---------------------------|
| bbf-fast | TR-355 | REQUIRED for a G.fast DPU |
| bbf-ghs | TR-355 | REQUIRED |
| bbf-melt | TR-355 | OPTIONAL |
| bbf-selt | TR-355 | OPTIONAL |
| bbf-vdsl | TR-355 | REQUIRED for a VDSL2 DPU |
| bbf-fastdsl | TR-355 | REQUIRED |
| bbf-hardware-rpf-dpu | TR-355 | OPTIONAL |
| bbf-gbond | TR-355 | OPTIONAL |
| ietf-interfaces | RFC 7223 | REQUIRED |
| iana-hardware | RFC 8348 | REQUIRED |
| ietf-hardware | RFC 8348 | REQUIRED |
| ietf-netconf-monitoring | RFC 6022 | OPTIONAL |
| iana-if-type | RFC 7224 | REQUIRED |
| ietf-inet-types | RFC 6021 | REQUIRED |
| ietf-yang-types | RFC 6991 | REQUIRED |

Table 2 specifies the DPU YANG modules to be supported by a DPU Model 1.

Table 2. YANG modules to be supported by a DPU Model 1.

| Module reference | Document reference | Support by DPU |
|------------------|--------------------|---------------------------|
| bbf-fast | TR-355 | REQUIRED for a G.fast DPU |
| bbf-ghs | TR-355 | REQUIRED |
| bbf-melt | TR-355 | OPTIONAL |
| bbf-selt | TR-355 | OPTIONAL |
| bbf-vdsl | TR-355 | REQUIRED for a VDSL2 DPU |
| bbf-fastdsl | TR-355 | REQUIRED |

| Module reference | Document reference | Support by DPU |
|---------------------------------------|--------------------|----------------|
| bbf-hardware-rpf-dpu | TR-355 | OPTIONAL |
| bbf-gbond | TR-355 | OPTIONAL |
| ietf-interfaces | RFC 7223 | REQUIRED |
| iana-hardware | RFC 8348 | REQUIRED |
| ietf-hardware | RFC 8348 | REQUIRED |
| ietf-netconf-monitoring | RFC 6022 | OPTIONAL |
| bbf-l2-dhcpv4-relay | TR-383 | REQUIRED |
| bbf-l2-dhcpv4-relay-forwarding | TR-383 | REQUIRED |
| bbf-ldra | TR-383 | REQUIRED |
| bbf-frame-classification | TR-383 | REQUIRED |
| bbf-sub-interfaces | TR-383 | REQUIRED |
| bbf-sub-interface-tagging | TR-383 | REQUIRED |
| bbf-subscriber-profiles | TR-383 | REQUIRED |
| bbf-l2-forwarding | TR-383 | REQUIRED |
| bbf-interfaces-statistics-management | TR-383 | REQUIRED |
| bbf-interfaces-performance-management | TR-383 | REQUIRED |
| bbf-mgmd | TR-383 | REQUIRED |
| bbf-pppoe-intermediate-agent | TR-383 | REQUIRED |
| bbf-qos-* | TR-383 | REQUIRED |
| iana-if-type | RFC 7224 | REQUIRED |
| ietf-inet-types | RFC 6021 | REQUIRED |
| ietf-yang-types | RFC 6991 | REQUIRED |

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