TECHNICAL REPORT

TR-355
YANG Modules for FTTdp Management

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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 common YANG modules:

- bbf-yang-types: Common BBF YANG types.

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).

Future Amendments are likely to define additional YANG modules.

The YANG modules of TR-355 are posted on GitHub at https://github.com/BroadbandForum/yang. This file documents the theory of operation and structure of the YANG modules in TR-355. This file also provides a starting point for understanding TR-355; containing 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 be in RFC 2119 [1].

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]	RFC 2119	*Key words for use in RFCs to Indicate Requirement Levels*	IETF	1997
[2]	RFC 7223	*A YANG Data Model for Interface Management*	IETF	2014
[3]	RFC 6991	*Common YANG Data Types*	IETF	2013
[4]	RFC 6020 bis	*The YANG 1.1 Data Modeling Language*	IETF	2016

[5]	draft-entitydt-netmod-entity	*A YANG Data Model for Entity Management*	IETF	2016
[6]	TR-301	*Architecture and Requirements for Fiber to the Distribution Point*	BBF	2015
[7]	TR-252i3	*xDSL Protocol-Independent Management Model*	BBF	2013
[8]	TR-371	*G.fast Vector of Profiles (VoP)*	BBF	2016
[9]	TR-298	*Management model for DSL line test*	BBF	2013
[10]	G.9700	*Fast access to subscriber terminals (G.fast) – Power spectral density specification*	ITU-T	2014
[11]	G.9701	*Fast access to user terminals (FAST) - Physical layer specification*	ITU-T	2014
[12]	G.997.1	*Physical layer management for digital subscriber line (DSL) transceivers*	ITU-T	2012
[13]	G.997.2	*Physical layer management for G.fast transceivers*	ITU-T	2015
[14]	G.994.1	*Handshake procedures for digital subscriber line (DSL) transceivers*	ITU-T	2012
[15]	G.996.2	*Single-ended line testing for digital subscriber lines (DSL)*	ITU-T	2009

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
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.

4.1 bbf-yang-types

The bbf-yang-types module's YANG file is in the *common* directory. This module defines common BBF YANG types in bbf-yang-types.yang.

Documentation is in the *common/docs* directory.

4.2 bbf-fastdsl.yang

The bbf-fastdsl module's YANG file, bbf-fastdsl.yang, is in the *interface* directory. This module defines management objects related to an interface which may support one or more xDSL or G.fast technologies. bbf-fastdsl allows bbf-vdsl ,bbf-fast and bbf-ghs to be associated with to a single interface: bbf-fastdsl augments ietf-interfaces and bbf-fastdsl is in turn augmented by bbf-vdsl ,bbf-fast and bbf-ghs. Also, bbf-fastdsl defines supported-mode, configured-mode, and operational-mode for the interface.

Documentation is in the *interface/docs* directory.

4.3 bbf-ghs

The bbf-ghs module's YANG files are in the *interface* directory. The top level module is in file bbf-ghs.yang, and all included submodules have file names beginning with bbf-ghs. This is the G.handshake (ITU-T G.994.1 [14] YANG data model. G.hs is invoked at start-up by ITU-T standard systems and determines the type of system (e.g., G.fast, VDSL) will initialize on the line.

Documentation is in the *interface/docs* directory.

4.4 bbf-fast

The bbf-fast module's YANG files are in the *interface* directory. This is the G.fast YANG data model.

The top level module is in file bbf-fast.yang, and all included submodules have file names beginning with bbf-fast. The individual parameters are defined in *body.yang submodule files.

Documentation is in the *interface/docs* directory.

bbf-fast is structured according toTR-371 [8], and uses parameters defined in ITU-T G.997.2 [13].

4.5 bbf-vdsl

The bbf-vdsl module's YANG files are in the *interface* directory. This is the VDSL YANG data model.

The top level module is in file bbf-vdsl.yang, and all included submodules have file names beginning with bbf-vdsl. The individual parameters are defined in *body.yang submodule files.

Documentation is in the *interface/docs* directory

bbf-vdsl is structured according to TR-252i3 [7], further modified to align with bbf-fast. bbf-vdsl uses parameters defined in ITU-T G.997.1 [12].

4.6 bbf-selt

The bbf-selt module's YANG files are in the *interface* directory. This is the Single-Ended Line Test (SELT) YANG data model. SELT can test a line using a transceiver, or SELT can be performed by a test head.

The top level module is in file bbf-selt.yang, and all included submodules have file names beginning with bbf-selt. The individual parameters are defined in *body.yang submodules.

Documentation is in the *interface/docs* directory.

bbf-selt is structured according toTR-298 [9], and uses parameters defined in ITU-T G.996.2 [15].

4.7 bbf-melt

The bbf-melt module's YANG files are in the *interface* directory. This is the Metallic Line Test (MELT) YANG data model. MELT performs narrowband tests from a single end of a line.

The top level module is in file bbf-melt.yang, and all included submodules have file names beginning with bbf-melt. The individual parameters are defined in *body.yang submodule files.

Documentation is in the *interface/docs* directory.

bbf-melt is structured according to TR-298 [9], and uses parameters defined in ITU-T G.996.2 [15].

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 are contained in directory *interface/docs* and have 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.”
The UML diagrams are in .png files. There is a separate UML diagram in a .png file for each of the structural submodules in FAST.

Documentation for the bbf-vdsl module are contained in directory *interface/docs* and have 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.”
UML diagrams are in .png files. There is a separate UML diagram in a .png file for each of the structural submodules. Additionally file bbf-vop-notes.docx further describes the bbf-vdsl module structure, cross-references with TR-252i3 structure, and contains development notes for the bbf-vdsl module.

Documentation for the bbf-selt module are contained in directory *interface/docs* and have 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 are contained in directory *interface/docs* and have 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.”

6 Dependencies on related YANG modules and Standards

TR-355 is based on YANG 1.1 (RFC 6020bis [4]).

The following YANG modules are used by TR-355:

- ietf-interfaces.yang [2]
- ietf-yang-types.yang [3]

The following YANG definitions are anticipated to be used by TR-355:

- draft-entitydt-netmod-entity [5]

7 DPU/PMA Behavior

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

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 an FastDSL object for each FastDSL-capable port supported by non-removable hardware.
- This FastDSL object includes state data with capabilities, e.g "I support FAST" and/or "I support VDSL" (and therefore does not include any FAST or VDSL state objects).
- 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 created by the DPU implicitly through the configured mode(s) and configured on demand by the PMA.
- The PMA will configure the FastDSL object to be in FAST and/or VDSL mode (configuring both modes implicitly means G.hs is used to determine the operational mode).
- 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).

End of Broadband Forum Technical Report TR-355

