



SDN SBI Wireless Transport Profiles for Network Automation

Sample Document

get full document from standards.iteh.ai

Reference

DTS/ATTMTMmWT-0034

Keywords

5G, 6G, automation, backhaul, microwave,
millimetre wave, modelling, mWT, SDN,
transmission, X-Haul, YANG

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from the
[ETSI Search & Browse Standards](#) application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on [ETSI deliver](#) repository.

Users should be aware that the present document may be revised or have its status changed,
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2026.
All rights reserved.

Contents

Intellectual Property Rights	5
Foreword.....	5
Modal verbs terminology.....	5
Executive summary	5
Introduction	6
1 Scope	7
2 References	7
2.1 Normative references	7
2.2 Informative references.....	7
3 Definition of terms, symbols and abbreviations.....	8
3.1 Terms.....	8
3.2 Symbols.....	8
3.3 Abbreviations	8
4 Objectives.....	9
5 Alignment with ETSI Standards, IETF Models, and Plugtests Activities.....	9
6 Technical Approach	9
7 Plugtests Integration and Validation Status.....	10
8 Industry Relevance and Impact	10
9 Description of MW Hardware Configurations	11
10 Modelling Considerations and Clarifications	13
10.0 Introduction	13
10.1 Modular versus Fixed IDU Modelling	13
10.2 Dual RF ODU Identification	13
10.3 Ethernet versus IF Connectivity Between IDU and ODU	13
10.4 Current Interpretation on Modelling Differences	14
10.5 Full-Outdoor Radio	14
10.6 Treatment of BCA configurations	14
11 Hardware Inventory Modelling Profiles.....	14
11.0 Introduction	14
11.1 Split-mount IDU-ODU connectivity, modular IDU, 1+0 configuration	15
11.1.0 Introduction.....	15
11.1.1 ODU as a separate chassis	16
11.1.2 ODU as a module and child component of the indoor.....	17
11.2 Split-mount IDU-ODU connectivity, modular IDU, 2+0 configurations.....	17
11.2.0 Introduction.....	17
11.2.1 2+0 with single RF ODUs, separate eth boards, Ethernet connectivity	18
11.2.2 2+0 with single RF ODUs, single eth board, Ethernet connectivity	19
11.2.3 2+0 with dual RF ODUs, single eth board, Ethernet connectivity.....	20
11.2.4 2+0 with single RF ODUs, separate modem boards, IF connectivity.....	21
11.2.5 2+0 with single RF ODUs, dual IF modem, IF connectivity	22
11.2.6 2+0 with dual RF ODUs, dual IF modem, IF connectivity.....	23
11.3 Split-mount IDU-ODU connectivity, fixed (compact) IDU, 1+0 configuration	23
11.3.0 Introduction.....	23
11.3.1 ODU as a separate chassis	24
11.3.2 ODU as a module and child component of the indoor.....	25
11.4 BCA configuration	26
11.4.1 MW & Eband ODU as a separate chassis, Ethernet IDU ODU connectivity	26
11.4.2 MW ODU as a module & child component of the indoor, IF-based IDU-ODU connectivity.....	27

Annex A (informative):	Parameters used in the "5th mWT SDN Plugtests"	28
Annex B (informative):	Bibliography	29
History		30

Sample Document

get full document from standards.iteh.ai

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the [ETSI IPR online database](#).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

The aim of the present document is to provide a set of standardized, vendor-neutral attributes that can be uniformly interpreted across different implementations for network automation in the wireless transport domain. The present document defines a standard, common, and interoperable hardware inventory profile for microwave wireless backhaul within SDN-based transport networks. It specifies how microwave Network Elements shall represent and expose hardware inventory information using YANG data models, aligned with relevant IETF specifications, and exchanged via NETCONF between SDN Controllers and microwave equipment. Service-layer, performance, and control-plane aspects are referenced where necessary to support accurate and interoperable inventory representation.

The modelling approach profiles and uses IETF YANG modules, specifying the implementation guidelines to reflect real-world microwave configurations and operational deployment scenarios. The inventory framework covers simple 1+0 topologies, protected and capacity-oriented 1+1 and 2+0 solutions, heterogeneous multi-band combinations (microwave + E-band), XPIC-based architectures, and advanced multi-carrier or band and carrier aggregation configurations. It also accounts for practical variations in Indoor Unit (IDU) and Outdoor Unit (ODU) design, such as modular vs fixed IDUs, Ethernet vs IF-based ODU connectivity, and single vs dual RF ODUs, etc.

Validation activities associated with the present document are integrated into the ETSI SDN Plugtests Programme. Participating vendors implement the -YANG model profiles on their Network Elements and expose inventory information toward a multi-vendor SDN Controller for functional and interoperability testing. Plugtests-based feedback ensures model accuracy, consistency, and practical applicability in real deployment environments.

Strategically, the present document establishes a foundational inventory layer required for open, programmable, and disaggregated SDN transport architectures, in alignment with the framework defined in ETSI GR mWT 025 [i.2]. By eliminating proprietary dependencies at the Southbound Interface and enabling standardized, structured inventory data, the work in the present document supports large-scale automation, zero-touch provisioning, digital twin construction, and AI-assisted network operation. The resulting standardized inventory framework provides long-term benefits across operators, vendors, integrators, and the wider research and standardization community by reducing integration complexity, enhancing interoperability, and supporting future innovation in automation and autonomous networking.

Introduction

Microwave wireless backhaul networks constitute a critical part of modern transport infrastructures. Their integration into open SDN architectures has historically been constrained by the lack of standard, common, and interoperable - models. As a consequence, SDN Controllers have been required to interpret vendor-specific and inconsistent data structures, leading to increased integration effort, reduced automation potential, and limited portability of SDN applications.

The present document addresses this limitation by defining standard, common hardware inventory profiles for the SDN Southbound Interface, expressed through YANG models aligned with relevant IETF specifications. These profiles are tailored to real microwave configurations and operational deployment scenarios. The objective is to ensure that the microwave domain may be represented in a uniform, vendor-neutral, and interoperable manner within open, programmable, multi-vendor SDN transport networks.

Sample Document

get full document from standards.iteh.ai

1 Scope

The present document specifies the principles, objectives, and technical framework, which addresses the definition of standardized hardware inventory models for microwave wireless backhaul at the SDN Southbound Interface. It focuses on the modelling of hardware inventory information for microwave Network Elements as exchanged between a microwave SDN Controller and microwave Network Elements by means of standard, common YANG data model profiles exposed over NETCONF. Service-layer abstractions, performance management, and control-plane behaviour are present in the present document, when required to support accurate and interoperable hardware inventory representation.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found in the [ETSI docbox](#).

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents are necessary for the application of the present document.

- [1] [IETF RFC 8348 \(March 2018\)](#): "A YANG Data Model for Hardware Management".
- [2] [IETF RFC 8561 \(June 2019\)](#): "A YANG Data Model for Microwave Radio Link"
- [3] [IETF RFC 8343 \(March 2018\)](#): "A YANG Data Model for Interface Management".
- [4] [IETF RFC 7950 \(August 2016\)](#): "The YANG 1.1 Data Modeling Language".
- [5] [IETF RFC 6241 \(June 2011\)](#): "Network Configuration Protocol (NETCONF)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

- [i.1] [ETSI GR mWT 016 \(V.1.1.1\)](#): "Applications and use cases of Software Defined Networking (SDN) as related to microwave and millimetre wave transmission".
- [i.2] [ETSI GR mWT 025 \(V1.1.1\)](#): "Wireless Backhaul Network and Services Automation: SDN SBI YANG models".
- [i.3] [ETSI CTI 5th mWT SDN Plugtests Report](#) V1.0 (2025-12).
- [i.4] [ETSI 5th mWT SDN Test Plan](#) V1.0 (2025-12).
- [i.5] ETSI GR mWT 025 (V1.1.1): "Wireless Backhaul Network and Services Automation: SDN SBI YANG models".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

Band & Carrier Aggregation (BCA): typically referring to aggregating carriers in uniform or non-uniform bands

NOTE: In the present document, it is referring to aggregating Eband with traditional MW band.

Fixed (compact) IDU: IDU represented as a chassis, but with a predefined and fixed set of physical ports without modular containerization

full-outdoor: single, outdoor unit in which the modem, network interfaces, and radio unit are integrated within the same physical hardware

Modular IDU: IDU of modular design and may include one or more containers hosting pluggable functional boards

split-type (or split-mount) architecture: this configuration follows an architecture where the outdoor unit (MW ODU) is physically separated from the Indoor Unit (IDU)

NOTE: There are two principal connectivity variants used in current microwave systems: Ethernet-based IDU-ODU connectivity and IF-based IDU-ODU connectivity.

YANG model profile: standardized, vendor-neutral set of attributes, constraints and modelling guidelines applied to existing IETF YANG modules to ensure interoperable implementation across multiple vendors

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AI	Artificial Intelligence
BCA	Band and Carrier Aggregation
ETH	ETHerNet
FW	FirmWare
HW	HardWare
ID	IDentity
IDU	Indoor Unit
IEEE™	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IF	Intermediate Frequency
IP	Internet Protocol
LLDP	Link Layer Discovery Protocol
MODEM	MOdulator/DEModulator
MW	MicroWave
mWT	millimetre-Wave Transmission
NE	Network Element
NETCONF	NETwork CONFiguration protocol
NMS	Network Management System
ODU	OutDoor Unit
PTP	Precision Time Protocol
RF	Radio Frequency
RFC	Request For Comment
RO	Read-Only
RSL	Received Signal Level
RW	Re-Write

SBI	SouthBound Interface
SDN	Software Defined Networking
SFP	Small Form-factor Pluggable
SNMP	Simple Network Management Protocol
SW	SoftWare
XPIC	Cross-Polarization Interference Cancelling
YANG	Yet Another Next Generation

4 Objectives

The objectives of this new Profile are as follows:

- The new Profile shall define a standard, common, and interoperable YANG-based representation of microwave hardware inventory suitable for use in open SDN environments.
- The new Profile shall specify a minimum and sufficient set of inventory parameters required for consistent multi-vendor interpretation of microwave hardware.
- The new Profile shall reuse and profile relevant IETF YANG models and shall extend them where necessary to accurately represent real microwave network configurations.
- The new Profile should provide a controller-consumable representation that enables automated discovery, inventory synchronization, and lifecycle management of microwave Network Elements.
- The new Profile should establish a stable inventory foundation that enables zero-touch provisioning, software-defined networking, and AI-assisted network operation.

5 Alignment with ETSI Standards, IETF Models, and Plugtests Activities

The work specified in the present document is aligned with ETSI GR mWT 016 [i.1] as related to microwave and millimetre wave transmission" and ETSI GR mWT 025 [i.2], which define the SDN applicability framework for wireless transport networks. The present document extends this framework by introducing standard, common YANG-based inventory model profiles required to enable practical and scalable interoperability at the SDN Southbound Interface.

At the data modelling level, the new Profile shall be based on the use of relevant IETF YANG data models, including the hardware, interface, and microwave radio link models defined in IETF RFC 8348 [1], IETF RFC 8561 [2], and IETF RFC 8343 [3]. This use shall ensure alignment with global YANG modelling practices, compatibility with existing SDN controller ecosystems, and long-term sustainability of the resulting models. The reused IETF models shall be adapted and refined through explicit microwave-specific profiling rules to reflect the characteristics of microwave transport hardware and real deployment scenarios.

The activity shall be tightly coupled with the ETSI SDN Plugtests™ Programme. The architectural principles and multi-vendor environments validated across the ETSI mWT SDN Plugtests activities to date have been used as input to the development of the present document. In particular, the methodologies, test scenarios, and multi-vendor configurations documented in the 5th ETSI mWT SDN Plugtests report [i.3] have been used as a concrete validation reference. In addition, the ETSI SDN Plugtests environment shall continue to be used to validate the YANG model profiles defined in the present document in real multi-vendor SDN control scenarios and to refine the models based on implementation feedback.

6 Technical Approach

The technical approach adopted in the present document follows the ETSI mWT SDN architectural framework and is based on the use of standard, YANG data model profiles derived from relevant IETF specifications, specified using YANG version 1.1 as defined in IETF RFC 7950 [4].