InCoax D2501

DPU

Hardware User Manual

InCoax D2501 EU

InCoax D2501 UK

InCoax D2501 US

Document History

Date	Rev	Originator	Description
2021-01-14	V.1	Helge Tiainen	Initial version.

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1 Abbreviations, Definitions, and Notes

1.1 Abbreviations

The abbreviations that are used in this document are defined in ***Table 1***.

Table 1 *— Abbreviations.*

Abbreviation	Description
CATV	Cable TV.
CE	CE marking is a certification mark that indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area.
CPE	Customer-Premises Equipment or Customer-Provided Equipment.
C-VLAN	Customer VLAN is the VLAN that the customer uses or sees (the inner tag). C-VLAN is the VLAN tag the customer is using on their own devices. (See QinQ.)
DHCP	Dynamic Host Configuration Protocol is an automatic configuration protocol used to automatically assign IP addresses to devices on a TCP/IP network.
DPU	Data Processing Unit; often referred to as an Access Node or Control Unit.
EMC	Electro Magnetic Compatibility.
FCC	The Federal Communications Commission is an independent agency of the United States government created by statute to regulate interstate communications by radio, television, wire, satellite, and cable.
IGMP	Internet Group Management Protocol is a protocol used to establish multicast group membership.
MAC Address	Media Access Control address is a unique identifier assigned to a Network Interface DPU (NIC) for communications at the data link layer of a network segment. MAC addresses are used as a network address for most IEEE 802 network technologies, including Ethernet, WiFi, and Bluetooth.
MGMT	Denotes the Management port on the *DPU*.
OFDM	Orthogonal Frequency-Division Multiplexing is a method of encoding digital data on multiple carrier frequencies.
PHY	Physical Layer of the OSI model.
PPPoE	Point-to-Point Protocol over Ethernet is a network protocol for encapsulating PPP frames inside Ethernet frames.
PON	Passive Optical Network with its variants XGS-PON, GPON and EPON.
QAM	Quadrature Amplitude Modulation is the name of a family of digital modulation methods and a related family of analog modulation methods widely used in modern telecommunications to transmit information.
QinQ	An Ethernet networking standard informally known as QinQ, was incorporated into the base IEEE 802.1Q standard in 2011. The IEEE 802.1Q technology improves the utilization of VLANs by adding another IEEE 802.1Q tag to tagged packets. (See C-VLAN and S-VLAN.) See reference ***{a}***.
QoS	Quality of Service is the ability to provide different priority to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow.
QPSK	Quadrature Phase-Shift Keying.
RoHS	Restriction of Hazardous Substances. This is a directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment. See reference ***{b}***.
SerDes	Serializer/Deserializer is a pair of functional blocks commonly used in high-speed communications to compensate for limited input/output.
SFP/SFP+	Small Form factor Pluggable transceiver. SFP ≤ 1 Gbps and SFP+/Enhanced ≤ 10 Gbps.
SOAP	Simple Object Access Protocol is a protocol for exchanging structured information.
S-VLAN	Service VLAN is the VLAN that the service provider network sees (the outer Q-tag). S-VLAN is the VLAN the service provider puts the entire customer traffic in. (See QinQ.)
TCP/IP	Transmission Control Protocol/Internet Protocol is the architecture for data communication over networks.
TDD	Time Division Duplex is the topology adopted to make communication between two wireless devices at one frequency but with two different time instants.

Abbreviation	Description
TDMA	Time-Division Multiple Access is a channel access method for shared-medium networks.
URL	Uniform Resource Locator is the address of a resource on the Internet.
UTP	Unshielded Twisted Pair.
Web GUI	Web Graphical User Interface is a user interface that allows users to interact with in:xtnd electronic devices through a web page.
WEEE	Waste Electrical and Electronic Equipment.
XML	eXtensible Markup Language is languages which describe the information.

1.2 Definitions

Table 2 shows the terminology and definitions that are being used in this document.

Table 2 — *Definitions of the Terminology.*

Term	Definition
Access Modem	The InCoax Modems is a series of Ethernet over Coax network terminals providing 1-Gbps Ethernet. The modems communicate with the InCoax D2501 DPU based on the MoCA Access™ 2.5 standard. The Access Modems are installed in the subscribers' premises. The in:xtnd™ Access A101 is a 1 Gbps Ethernet port Modem. These devices will be referred to as the *Modem* in this document.
DPU	The InCoax D2501 is a one-channel Ethernet over Coax Access Node, capable of 2.5 Gbps on the RF port supporting up to 8, 16 or 31 Modems depending on model. The communication with the Modems is based on the MoCA Access™ 2.5 standard. This device will be referred to as the *DPU* in this document.
Customer	End user or subscriber of broadband services.
Diplexer	The in:xtnd™ Combine(diplexer) is a series of high-performance bidirectional frequency combiners, i.e. for combining and splitting frequencies. The combiners/diplexers are used for connecting one or two MoCA Access broadband frequency spectrum signals from an in:xtnd™ DPU with Radio/TV frequency spectrum signals into a single coaxial cable. The bidirectional diplexer also protects the DPU from receiving RF signal disturbances outside of the MoCA Access broadband frequency spectrum and should always be installed. These devices will be referred to as the *Diplexer* in this document.
Management System	The InCoax Management System is a Linux-based, advanced element manager with features for DPU deployment, control, and supervision of the coax link conditions. It includes essential functions for service provisioning and network management. This software will be referred to as the *Management System* in this document.
MoCA Access	The MoCA Access™ 2.5 standard is a point-to-multipoint access technology over coaxial network. It is designed to co-exist with legacy services such as TV and DOCSIS 3.0/3.1. The operating frequency range is between 400 MHz and 1675 MHz. See reference ***{c}***.
Trunk	The Trunk is the uplink port from the *DPU*. It uses SFP modules.

1.3 Notes

The references to another document or web sites are labeled with a lower case **bold** and *italic* letter within this kind of brackets ***{ }***.

All references in the text to a section, figure, and table are denoted with **bold** and *italic*.

2 Package Content

Check that all the accessories and items, as shown in ***Table 3***, are present in the package.

(The images are illustrations and may differ from the real items.)

Table 3 — *Contents of the package.*

Product	Item Description	Item picture
MoCA Access DPU D2501	XGS-PON, GPON, EPON and Ethernet Access Node, capable of 2.5 Gbps (max. 3.2 Gbps aggregated) on the RF port.	
Quick Guide	Quick Guide.	
Warranty	Warranty coverage, Technical specification, Disposal & Recycling document.	
Additional Information		
Power Supply	Power cord with EU plug, order DPU with article D2501 EU	If DC power feed 13-25VDC is used, the Power Cord may be disconnected from power outlet (if not used for back-up power). The cord can be detached from the Power Supply unit and disconnected from the enclosure. Please fill the Power Input bushing with the rubber plug.
	Power cord with UK plug, order DPU with article D2501 UK	
	Power cord with US plug, order DPU with article D2501 US	

3 Read This First

Always make sure to connect all coaxial cables and network cables to *DPU* before connecting the power cable. Ground the DPU enclosure in the DPU earth terminal with coaxial network earth terminal. This **must** be done to avoid electrical shock and to avoid damage to the unit. Ground loops might build up enough electrical charge to give an electrical shock if not properly connected before connecting the power cord. Make sure to connect the CATV amplifier's ground connection to the *DPU* unit if both the CATV amplifier and *DPU* are installed in the same physical location.

3.1 When Using the DPU

The *DPU* is designed to operate on 100/230VAC or 13-25 VDC. If the unit is **not** powered using the power supply delivered with the *DPU*, but in any other way directly or indirectly with 13-25 VDC, a 3 A fuse **must be** fitted to the DC power cable. ***Warranty may be void or limited due to use of other than recommended power supply.***

Please observe the following:

- Do not stick any foreign objects, like metal or flammable objects into the *DPU*, as this can cause fire or electric shock.
- Do not remove the inner cover sheets or modify them in any way.
  - High voltages which can cause severe electric shocks are present inside the *DPU* enclosure. For any inspection, adjustment, and repair work please contact the local InCoax dealer. The warranty may be void if the cover to the high voltage DPU area has been opened.
  - Never attempt to repair this product yourself. Improper repair work can be dangerous. Never disassemble or modify this product. Tampering with this product may result in injury or fire. The warranty is void if the cover to the low voltage DPU area has been opened.
- Do not handle the power supply plug with wet hands as this may cause electric shocks.
- Do not use in locations subject to high humidity or dust levels exceeding IP certification, as this may cause damage to the equipment or start a fire.
- Do not do anything that may damage the power cable. When disconnecting the power cable, pull on the plug body, not the cable.
- Do not damage a power cable, make any modifications to it, place heavy objects on top of it, heat it, place it near any hot objects, twist it, bend it excessively, or pull it. To do so may cause fire and electric shock. The whole power cord should be discarded if the cable is damaged in any way.
- The power cord shall also be discarded if the plug is damaged.
- Do not place heavy objects on top of the *DPU*.
- Securely insert the power supply plug as far as it will go.
- Unplug all cables connected to the *DPU* before moving it.

It is recommended to unplug the power cord from the wall outlet if the *DPU* is not going to be used for any prolonged length of time.

Never have management port connected while using management VLAN!

3.2 Coaxial Network Requirements

Please consider the following during the installation of the *DPU*.

The risk of potential differences and the spread of voltage from faulty equipment is largely linked to the design of the power installation in the building. If the coax connections are not galvanically separated according to the standard EN 60728 ***{d}*** then a galvanic separator, shall be used between the coax connection and the *DPU*.

In terms of potential equalization, the EN 50083-1 ***{e}*** and EN 60728 shall be followed. Cable distribution systems shall be designed and constructed so that no dangerous voltages can occur in the external conductors of any cables or in metal cases on passive parts.

3.3 Warning

If the *DPU* is installed in an environment where the surrounding temperature is 70 °C (158 °F) or more, the coax connectors can reach a temperature of more than 85 °C (185 °F). In this case the coax connectors must not be covered or in contact with combustible materials due to the risk of fire.

3.4 Installation Environment

Install the *DPU* in a site free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.

Install the *DPU* in a cool and dry place for the acceptable temperature and humidity operating ranges.
See ***section 7*** on page 13 for the actual temperature ranges.

Install the *DPU* on a sturdy, level surface that can support at least 5 kg (11 lbs) of weight. Leave at least 10 cm (4 inches) of space at the front for the coax cables.

Connect a 75-ohm terminator (F connector) in all coax ports that are not used on the *DPU*.

Make sure that there are no insulating materials that can cover the *DPU* by accident.

Please also make sure that there are no corrosive liquids or materials that can emit any corrosive gases in the same room as the *DPU*.

3.5 Storage Environment

The ideal storage location is a dry and well-ventilated location, e.g. in a space with climate-control. Please refer to ***section 7*** on page 13 for more details about the specified environmental storage conditions.

3.6 Theft and Vandalism

Depending on the circumstances for the installation it may be appropriate to mount the equipment (i.e. the *DPU*, *Diplexers* and Switches) in a cabinet that can be locked securely.

4 Introduction

This document describes some of the features of an InCoax D2501 model. It also includes a technical specification, as well as information about the regulatory statements and the proper disposal of the equipment.

This specific model of the *DPU* provides a throughput of 2.5 Gbps (max. 3.2 Gbps) on the coax port.

4.1 InCoax D2501 MoCA Access DPU System

InCoax™ is a provider of broadband access solutions leveraging existing in-building coaxial cable networks. The InCoax D2501 MoCA Access DPU System consists of a *Persistent Management Agent Aggregator (PMAA)* if NETCONF/YANG communication protocol is used *or Automatic Configuration Server (ACS)* if Configuration WLAN Management Protocol (CWMP) is used, hereafter called *Management System*, which manages the *DPUs* installed in, or near, buildings and *Modems* installed in the customers' homes. An illustration of the *Management System* can be seen in ***Figure 1***. The *Modem* is easily connected by the customers without any requirements for customer configuration. This architecture makes the MoCA Access DPU System very flexible supporting different types of networks. Once the *DPU* has been installed in, or near, the building the only required operation to connect new customers is to provide them with a *Modem*. (Please refer to the InCoax handbook ***System Design Guidelines for Cable Technicians*** for guidance.) As soon as the *Modem* has been connected to the coaxial network, it will automatically be detected and configured by the *DPU* through the *Management System* (if such setup has been enabled in the Management System).

The typical MoCA Access DPU System consists of distributed *Management System Architecture* which handles thousands of *DPUs* and millions of *Modems*. If there is a legacy cable-TV service in the building the TV signal must be combined with the broadband signal using the *Diplexer Filter*. The *Management System* is used as a customer configuration, monitoring, and provisioning tool through a web interface or be accessed by provisioning system or Operating Support System through NETCONF or TR-069 interface.

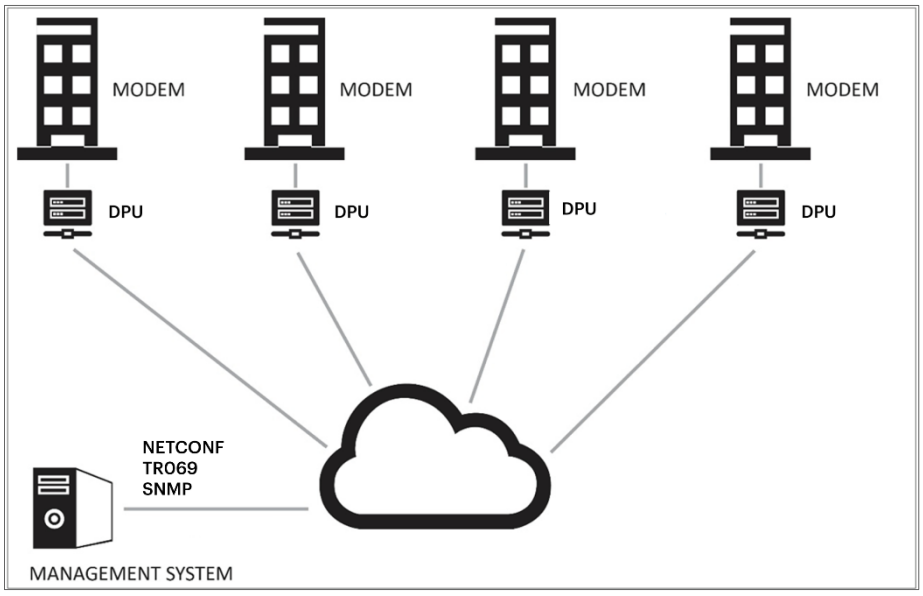

Figure 1 *— Overview of the Management System.*

4.2 The DPU

The *DPU* acts as a bridge between the incoming XGS-PON, GPON, EPON or Ethernet access network and customers' Ethernet *Modem* port, using the in-building coaxial network as transport for data traffic to the *Modems*. The *DPU* communicates with all *Modems*, over dedicated RF bands, in the coaxial network to manage their individual configuration, enforces traffic, and security policies. It also collects and stores traffic statistics data from the network.

4.3 MoCA Access Modem

The *Modem* is available in different models. There are also different variants depending on which MoCA band is used.

The *Modem* connects to any antenna outlet in the subscribers' homes for easy self-installation. It communicates with the *DPU* to get configuration parameters and connects to the subscribers' Ethernet modem RJ45 port. The firmware of the Modem can be upgraded from the *DPU*.

4.4 Principal deployment model

Figure 2 shows an example of the in-building principal deployment model of D2501.

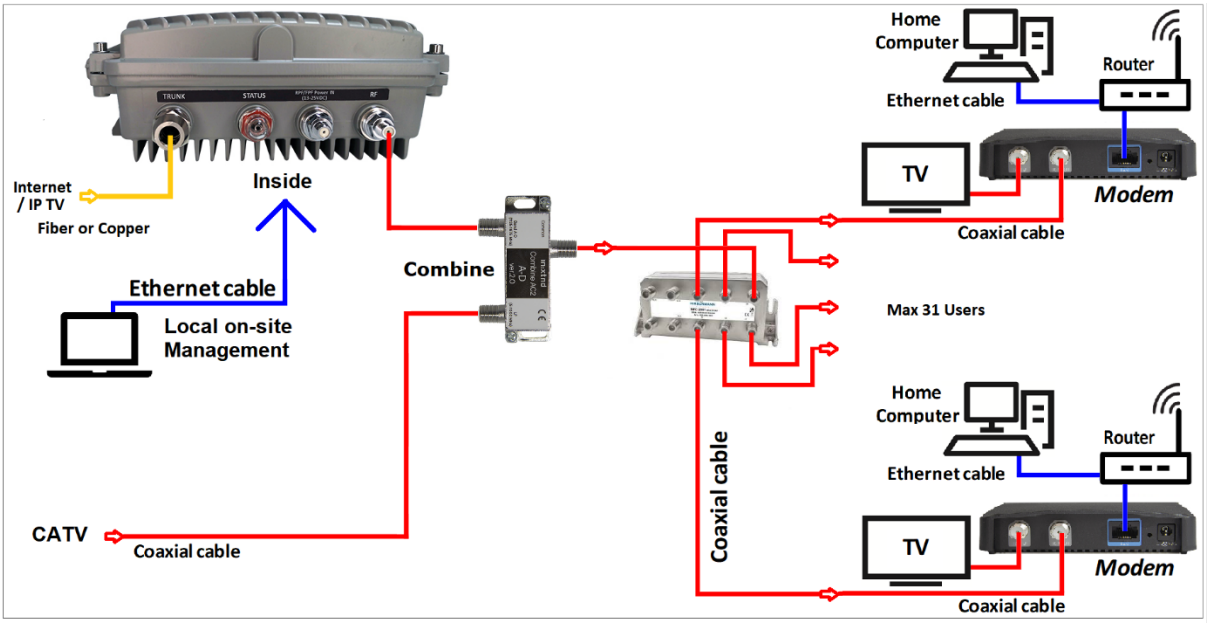

Figure 2 *— Overview of principal deployment model.*

5 Coaxial Network Use Cases

In general, the D2501 can be used for different coaxial network use cases depending on the used spectrum for the current TV/DOCSIS services. MoCA Access have five default frequency bands and InCoax has added two additional frequency bands as presented hereunder:

- Band A-A 400-900 MHz for residential networks with specified spectrum up to 1002 MHz.
- Band A-AH 550-850 MHz for hotel networks with specified spectrum up to 862 MHz.
- Band A-AS 400-800 MHz co-existence in satellite networks with spectrum up to 2150 MHz.
- Band A-B 800-1300 MHz co-existence in TV networks with a spectrum up to 1300 MHz.
- Band A-C 1025-1675 MHz co-existence in TV / DOCSIS 3.0 networks with a spectrum up to 1800 MHz.
- Band A-D 1125-1675 MHz co-existence in TV / DOCSIS 3.0 networks with a spectrum up to 1800 MHz.
- Band A-E 1375-1675 MHz co-existing in TV/DOCSIS 3.1 networks with a spectrum up to 1800 MHz.

5.1 Coexistence with Terrestrial TV, 47 - 694 MHz

MoCA frequency band A-B combined with terrestrial TV in a Cascade (Figure 3), Star coaxial network (Figure 4) and US Home Run networks (Figure 5).

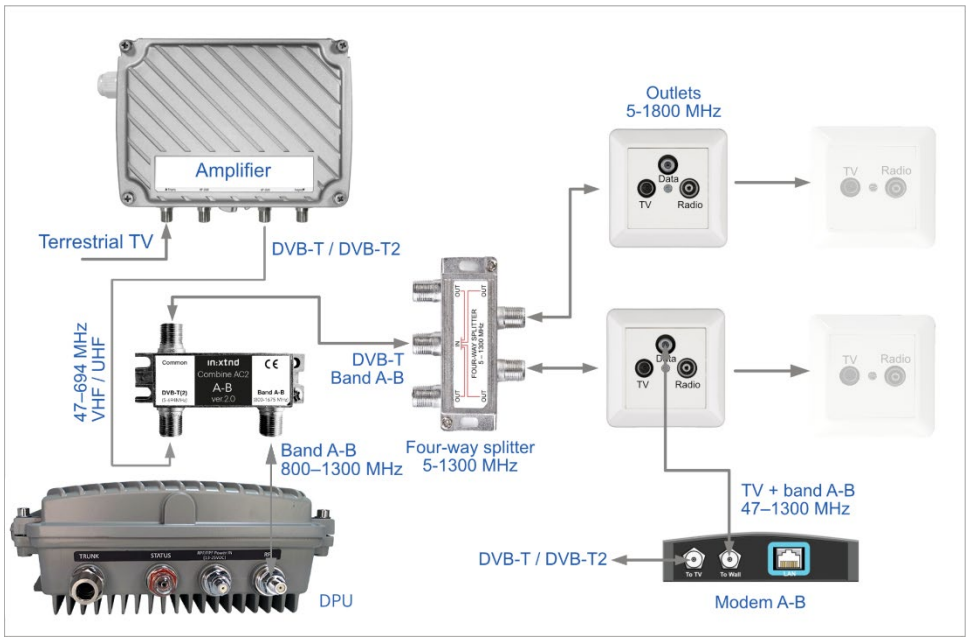

Figure 3 *— Set up for the use case "Terrestrial TV" (Cascade network).*

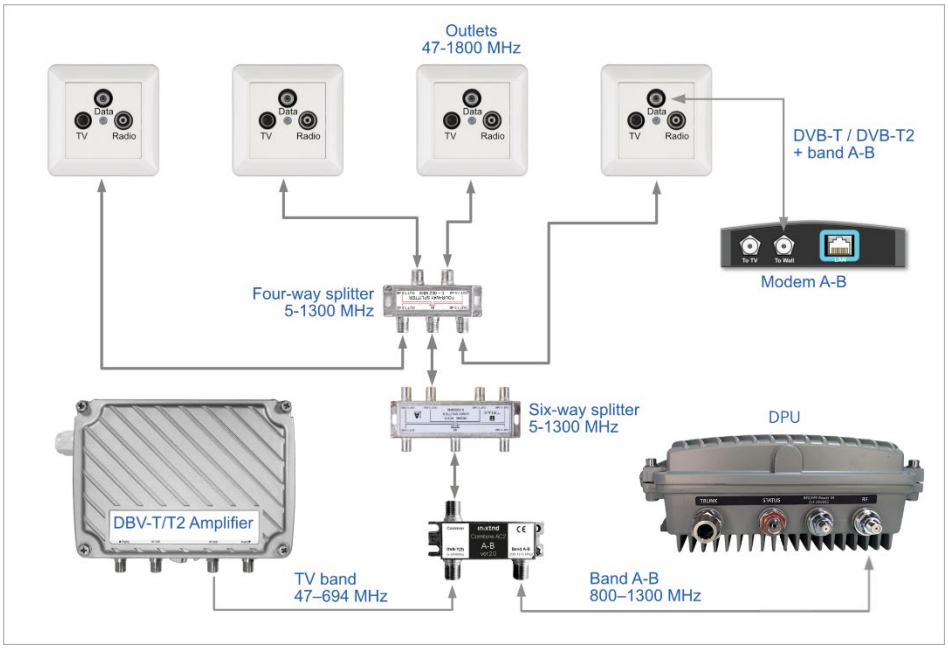

Figure 4 *— Set up for the use case "Terrestrial TV" (Star network).*

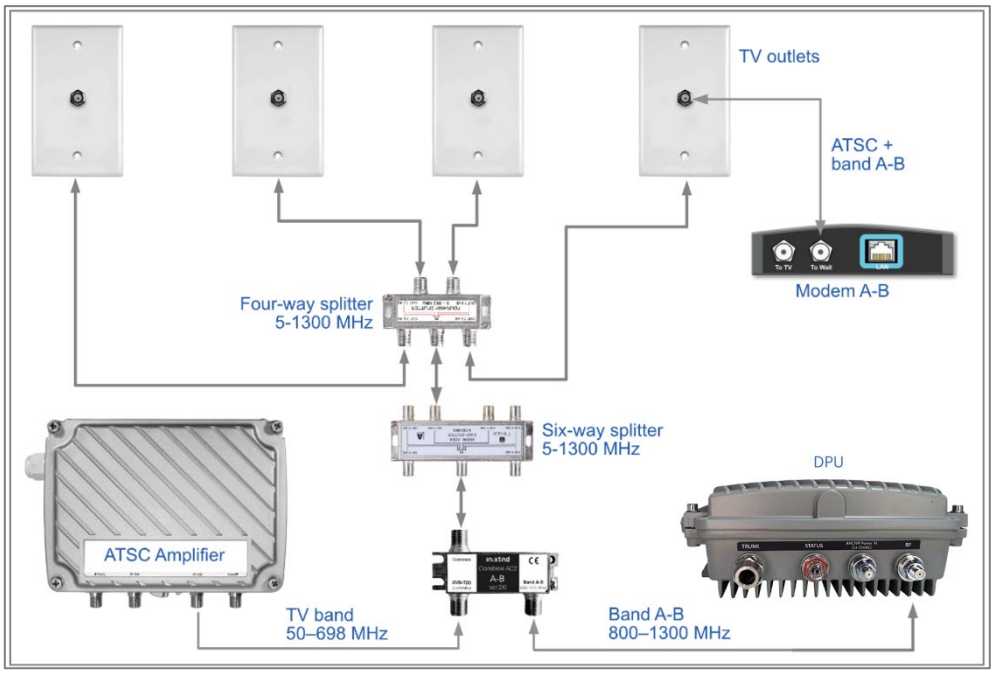

Figure 5 *— Set up for the use case "Terrestrial TV" (US Home Run network).*

5.2 Coexistence with Cable TV/DOCSIS 3.0

MoCA frequency band A-D combined with Cable-TV/DOCSIS 3.0 in a Cascade (***Figure 6***) and Star coaxial network (**Figure 7**).

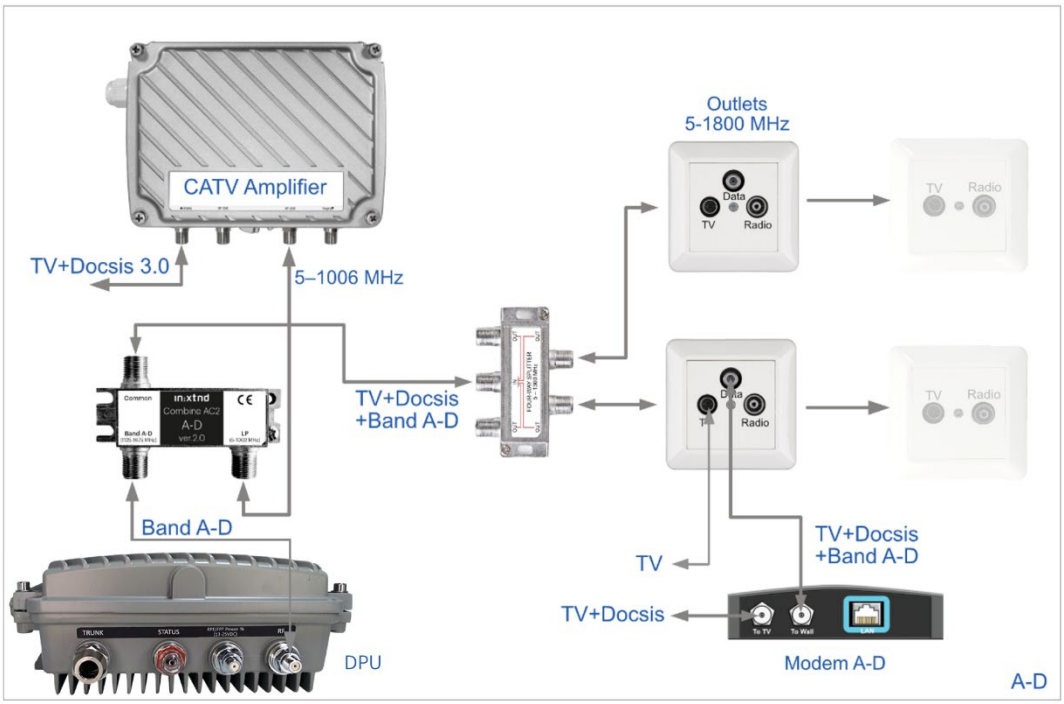

Figure 6 *— Set up for the use case "Cable TV/DOCSIS 3.0" (Cascade network).*

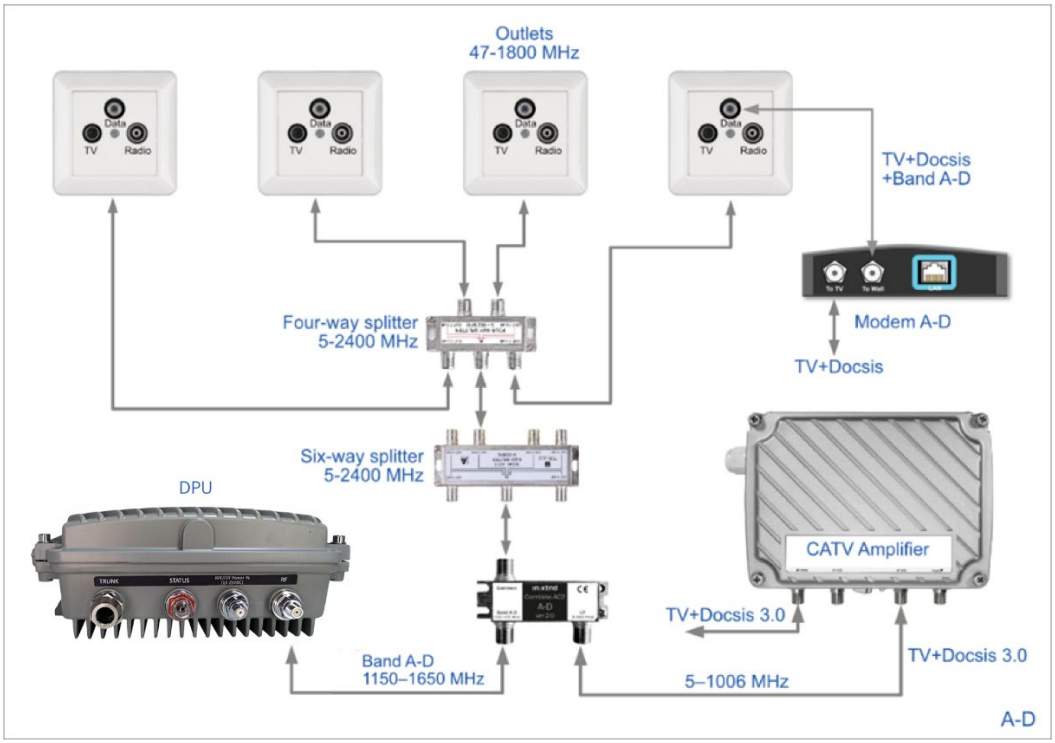

Figure 7 *— Set up for the use case "Cable TV/DOCSIS 3.0" (Star network).*

5.3 Coexistence with Satellite

High frequency Satellite-TV signals combined with MoCA frequency band A-A (A-AS). See ***Figure 8***.

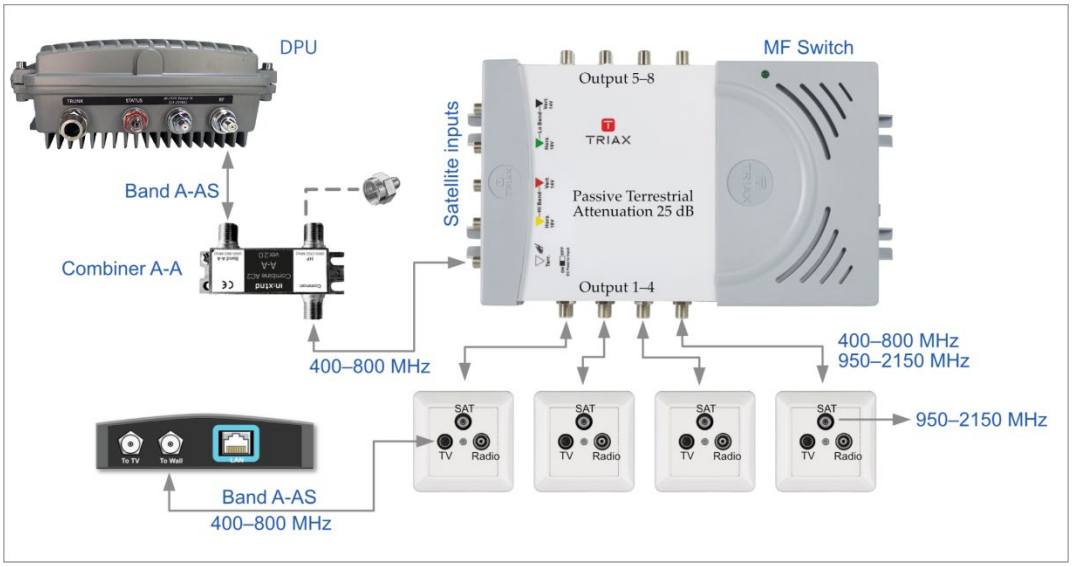

Figure 8 *— Set up for the use case "Satellite".*

6 DPU Web Interface Access

The *DPU* can be managed via the management port using a web interface. Please refer to the InCoax document "Configuration Manual" for a more detailed description of the web interface and how to set up the *DPU*. See reference ***{f}***.

6.1 Accessing the DPU Web Interface

Connect a computer with an Ethernet cable to the Management port on the *DPU (under the front cover)*, marked **MGMT RJ45**. See ***Figure 9***. (InCoax recommends using the cable type CAT5e as a minimum for best performance.)

For best user experience InCoax recommends you to enable JavaScript.

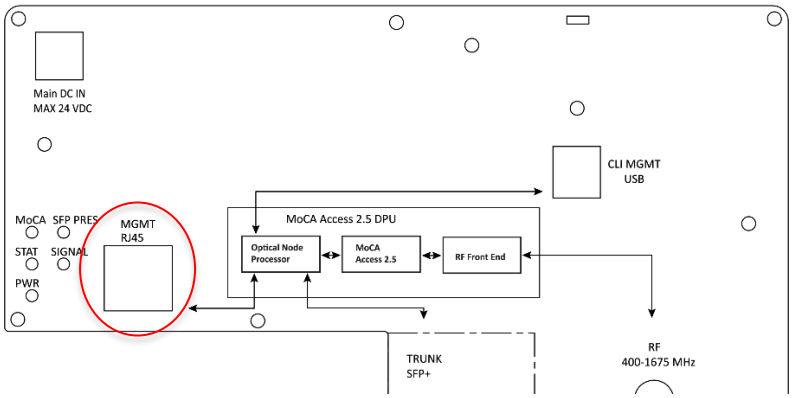

Figure 9 *— The DPU's panel connections.*

7 Specifications

The electrical, physical and functional specifications for the D2501 DPU. Please note that the specification may be subject to change.

Performance

- Based on MoCA Access 2.5 Profile D. See reference ***{c}***.
- 2.5 Gbps throughput on the MoCA port with 30dB SNR.
- 3.2 Gbps throughput on the MoCA port with 40dB SNR.
- Max 31 Modems.
- MoCA Bands: A - A, A - AH, A - AS, A - B, A - C, A - D and A - E
- Frequency range: 400 to 1675 MHz
- RF channel bandwidth: 100 MHz
- Bonded operation supporting 3, 4, or 5 RF channels.
- 17 dBm maximum output power; automatically adjusted per modem.
- Configurable beacon frequency.
- Modulation: OFDM, QAM 8, 16, 32, 64, 128, 256, 512, or 1024; BPSK and QPSK
- Multiplexing methods: TDMA/TDD
- Communication: Half-duplex

Physical:

- Northbound fiber SFP+ port inside enclosure.
- Multi Source Agreement (MSA) compliant, SerDes – 10 Gbps data rate, SFF-8472 (see reference ***{h}***) – Diagnostics interface.[a]
- Supporting XGS-PON, XG-PON, GPON, EPON and Active Ethernet.
- Management Ethernet port inside enclosure: 10 / 100 / 1000 Mbps, configuration and statistics port.
- RJ-45 connector supports type CAT5 UTP (as a minimum).
- One coax out with PG-11.
- F-female connector - 3/8-UNEF32, 75 Ω
- F-female connector - 3/8-UNEF32, 75 Ω for 13-25VDC power feed

Indicators

- Power on, Management, Trunk, Coax Link traffic and alerts.
- External led indication on ZTP and system initiation and status.

Dimensions

- 257 × 203 × 100 mm (W × H × D)
- Wall mount

Weight

- 3 kg

Environmental

- Operating temperature: -30 °C to +70 °C
- Relative humidity: 20 % to 80 %
- Altitude: maximum 2000 m
- Dynamic temperature control with cooling redundancy.
- Abnormal operation conditions alarms
- Storage (non-condensing): -40 °C to +70 °C and 5 % to 90 % relative humidity
- RoHS and RoHS 2. See reference ***{b}***
- UL 94 V-0. See reference ***{i}***

Power

- 100-240VAC, 50/60Hz
- 13-25VDC
- Power consumption 12 W nominal.
- Automatic power on after power grid failure.

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[a] InCoax recommends using the SFP+ module:
Fiber MM: Ubiquiti 10G UF-MM-10G
Fiber SM: InCoax 10G OS-SP96-3110D/ Ubiquiti 10G UF-SM-10G/ Ubiquiti Bi-Di UF-SM-10G-S/ Finisar FTLX1475D3BTL/ NorthLab NORT-1031-LRT/ FS 10GBASE-BX BiDi SFP+ 1330nm-TX/1270nm-RX 10km DOM Transceiver Module/ FS 10GBASE-BX BiDi SFP+ 1270nm-TX/1330nm-RX 10km DOM Transceiver Module
Copper: MikroTik 10G S+RJ10/ Ubiquiti 10G UDC-2

IEEE Standards

- IEEE 802.3 (Ethernet) ***{k}***
- IEEE 802.3u (Fast Ethernet) ***{m}***
- IEEE 802.1p (Priority tags) ***{g}***
- IEEE 802.1q (VLAN with full VLAN-ID range. Up to 200 VLAN Configurable internal VLAN for policing, shaping and prioritization for ingress untagged frames) ***{a}***
- IEEE 802.1ad (QinQ) ***{j}***

Approvals

- FCC ID 2ATQM1000-0XXX ***{n}***
- Marking: CE (see ***section 8.1.2***), FCC (see ***section 8.1.3***), IC, TUV SUD NRTL (see ***section 8.1.4***), UKCA (see ***section 8.1.5***)
- EMC: EN55032:2015 Class B, EN55035:2017 ***{o}***, FCC Part 15 B Class B, ICES-003 Class B (see ***section 8.1.1***), ETSI EN 300386, V2.1.1:2016-07 + Annex D
- Safety: IEC62368-1:2014, EN62368-1:2014 ***{p}*** + A11:2017, AS/NZS 62368.1:2018, CSA/UL 62368-1:2014
- ROHS: ROHS 2.0

Security

- DHCP snooping, Option 82 rewrite and trusted/untrusted clients, limit setting, configurable options per VLAN.
- Blocking of unknown CPE.
- Broadcast storm protection from clients.
- Support for PPPoE IA option 0x105 Remote ID.

Multicast

- IGMP snooping (v2,v3).
- IGMP filtering per VLAN.
- Configurable IGMP timeout.
- Multicast VLAN Registration.
- Bandwidth reservation per multicast group.
- Max. 256 Multicast groups and MAC addresses.

QoS

- Traffic classification.
- Mapping and remarking.
- Congestion management.
- Strict priority, four separate queues for broadcast, multicast, and unicast.
- Configurable rate limitation per queue.
- Configurable upstream/downstream ratio.

Management

- IPv4 WEB GUI via https.
- NETCONF / YANG.
- CWMP -TR069
- MoCA Access MIB and TR-181
- Statistics and system/version information.
- Configuration.
- Define and assign service profiles.
- Built in spectrum analyzer.
- Access through management VLAN or separate management Ethernet port.
- Remotely upgradable.

8 Legal Information

8.1 Regulatory Notice and Statement (Class B)

Model List: InCoax D2501

8.1.1 Canada

The following information applies if the product is used within the Canada area.

Industry Canada ICES Statement

CAN ICES-003 Class B. See reference ***{q}***.

8.1.2 European Union

The following information applies if the product is used within the European Union.

CE EMC Statement

Warning: This equipment is compliant with Class B of EN 55032. In a residential environment this equipment may cause radio interference. See reference ***{o}***.

8.1.3 United States of America

FCC Part 15 B Class B

The following information applies if the product is used within the USA area.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. See reference ***{n}***. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

Caution: Changes or modifications not expressly approved by the party responsible for the compliance could void the user's authority to operate the equipment.

8.1.4 TUV SUD NRTL

This equipment is compliant with the UL62368-1, CAN/CSA-C22.2 NO. 62368-standard.

TÜV SÜD is an OSHA recognized Nationally Recognized Test Laboratory (NRTL), a Certified Body and Inspection Body with **SCC** (Standards Council of Canada), an accredited EMC Testing laboratory with **A2LA**, and many others. TÜV SÜD is authorized by OSHA (Occupational Safety & Health Administration) as a NRTL capable of performing product safety testing to UL/ANSI Standards.

8.1.5 Great Britain

The UKCA (UK Conformity Assessed) product marking is used for goods being placed on the market in Great Britain (England, Wales and Scotland). The UKCA marking alone cannot be used for goods placed on the Northern Ireland market, which require the CE marking or UKNI marking.
It corresponds to the EU CE marking and covers most goods which previously required the CE marking.

UKCA (CE) EMC Statement

Warning: This equipment is compliant with Class B of EN 55032. In a residential environment this equipment may cause radio interference. See reference ***{o}***.

9 Disposal of Equipment

9.1 Waste Electrical and Electronic Equipment

The Waste Electrical and Electronic Equipment Directive (WEEE Directive) is the European Community Directive 2002/96/EC on waste electrical and electronic equipment which, together with the Restriction of Hazardous Substances Directive (RoHS Directive) 2002/95/EC (also known as RoHS 1) became European Law in February 2003. The WEEE Directive was amended into the Directive 2012/19/EU and the RoHS 1 has been evolved into the RoHS 2 Directive 2011/65/EU. See references ***{r}*** and ***{b}***, respectively.

The symbol adopted by the European Council to represent WEEE comprises of a crossed-out wheelie bin. The black rectangle below the wheelie bin indicates that the product has been placed on the market after 2005, when the WEEE Directive came into force. The symbol shall be placed on the products, packaging, and/or accompanying documents. It means that used electrical and electronic products and batteries should not be mixed with general household waste but taken to a designated collection site as indicated by the local authorities. In accordance with national legislation and the WEEE Directives 2002/96/EC and 2012/19/EU, and the Battery Directive 2006/66/EC amended by 2013/56/EU. See reference ***{s}*.**

For more information about collection and recycling of old products and batteries, please contact the local municipality, the local waste disposal service, or the point of sale where the item was purchased. Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

9.2 For Business Users in the European Union

Please contact the dealer or supplier for further information to discard electrical and electronic equipment.

9.3 Disposal in Countries Outside the European Union

The symbol has only validity in the European Union. Please contact the local authorities or dealer and ask for the correct method of disposal.

9.4 Battery Symbol

The WEEE symbol can be supplemented with one or more chemical symbols to indicate what kind of battery is used in the product. The chemical symbols will then be placed under the black rectangle.

10 References

{a} IEEE 802.1Q - The IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks.
standards.ieee.org/standard/802_1Q-2018

{b} RoHS 2 Directive 2011/65/EU - This is a directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
ec.europa.eu/environment/waste/rohs_eee

{c} MoCA Access™ 2.5 standard.
mocalliance.org

{d} EN 60728 - The Cable networks for television signals, sound signals and interactive services.
ec.europa.eu/standards/iec-60728

{e} EN 50083-1 - Cabled Distribution Systems for Television, Sound and Interactive Multimedia Signals
Part 1: Safety Requirements.
standards.globalspec.com/std/178814/EN50083-1

{f} InCoax D2501 Software User Manual - A detailed description of the web interface and the setup of the *DPU*.

{g} IEEE 802.1p refers to a specification for giving Layer 2 switches the ability to prioritize traffic as well as perform dynamic multicast filtering. Basically, it provides a mechanism for implementing Quality of Service at the MAC (Media Access Level) level. Quality of Service is a mechanism that allows for better handling of data that passes through the network.

{h} SFF-8472 standard - Specification for Management Interface for SFP+
members.snia.org

{i} UL 94 - This is a standard for tests for flammability of plastic materials for parts in devices and appliances; Underwriters Laboratories.
V-0 - burning stops within 10 seconds on a vertical specimen; drips of particles allowed as long as they are not inflamed.
standardscatalog.ul.com/standards/en/standard_94_6

{j} IEEE 802.1ad - This was an Ethernet networking standard informally known as “QinQ” and was an amendment to the standard IEEE 802.1Q-1998. The IEEE 802.1ad was incorporated into the base standard IEEE 802.1Q in 2011.

{k} IEEE 802.3 - This is a working group and a collection of IEEE standards produced by the working group defining the physical layer and data link layer's media access control (MAC) of wired Ethernet.
standards.ieee.org/standard/802_3-2018

{l} IEEE 802.3ac - IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) frame extensions for Virtual Bridged Local Area Networks (VLAN) tagging on IEEE 802.3 networks.
standards.ieee.org/standard/802_3ac-1998

{m} IEEE 802.3u - IEEE Standards for Local and Metropolitan Area Networks: Supplement - Media Access Control (MAC) Parameters, Physical Layer, Medium Attachment Units, and Repeater for 100Mb/s Operation, Type 100BASE-T (Clauses 21-30).
standards.ieee.org/standard/802_3u-1995

{n} FCC Class B part 15 of the FCC Rules
ecfr.gov/...47.1.15&rgn=div5#sp47.1.15.b

{o} EN 55035:2017 - Radio equipment Directive (2014/53/EU) - Electromagnetic compatibility of multimedia equipment - Immunity requirements CISPR 35:2016 (Modified).
ce-marking.help/directive/radio-equipment/standard/5/en-550352017#

{p} EN 62368-1:2014 - Low voltage (LVD) Directive (2014/35/EU) - Audio/video, information and communication technology equipment - Part 1: Safety requirements.
ce-marking.help/directive/low-voltage-lvd/standard/1639/en-62368-12014

{q} CAN ICES-003 Class B - Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement.
ic.gc.ca/eic/site/smt-gst.nsf/eng/sf00020.html

{r} WEEE Directive 2012/19/EU - This is the European Community Directive on Waste Electrical and Electronic Equipment (WEEE) which, together with the RoHS Directive 2011/65/EU, became European Law in February 2003.
ec.europa.eu/environment/waste/weee/index_en.htm
and
eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0019

{s} Battery Directive 2013/56/EU - This is an amendment to the Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries, accumulators, waste batteries, and accumulators.
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013L0056

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