GENERIC SPECIFICATION

IPTV-MATV DISTRIBUTION SYSTEM

TABLE OF CONTENTS

1   GENERAL

This document is a generic specification for an IPTV-MATV Media Distribution System in today's modern and evolving world. It builds on the legacy Master Antenna (MATV) / Satellite Master Antenna (SMATV) Television System specifications by including digital and internet-based technologies, integrating terrestrial, satellite, IPTV and OTT services.

The term IPTV-MATV has been chosen owing to its broad scope (all forms of content delivery), the shift to newer technology (streaming services and digital-first content), the convergence of delivery platforms and its wide use across industries.

This specification should always be read in conjunction with the scope of works and general services requirements relating media distribution for the site(s) in question.

Document versions and updates are listed in the table below.

Version	Status	Description / Comment	Date
0.1	Draft	Inclusion of IPTV in legacy MATV/SMATV specification	14 Oct 2024
0.2	Draft	Renaming to reflect current trends and direction; small amendments and addition of high-level GPON explanation	23 Oct 2024
0.3	Draft	Small changes following review	24 Oct 2024
1.0	Final	Final changes and publication of V1.0	30 Oct 2024

2 TERMS AND DEFINITIONS

TERM	DEFINITION
1000Base-X	Refers to a group of Gigabit Ethernet Standard where 1000 represents the speed (1000Mps /1 Gbps), base means baseband signalling and X can be SX (short wavelength using multimode fibre up to 550m), LX (long wavelength using single mode fibre up to 5km), CX (short distance copper cabling up to 25m) and T (Cat 5e or better twisted pair cabling up to 100m).
1310nm	Common wavelength for upstream transmission. Relatively low chromatic dispersion and signal loss (0.35 db/km) makes it ideal for short-medium distance communication. Denoted by Orange or Yellow.
1490nm	Common wavelength for downstream transmission. Relatively low chromatic dispersion and signal loss (0.25 to 0.35 db/km) makes it ideal for longer distance communication. Denoted by Green.
1550nm	Common wavelength for RF video transmission. Low chromatic dispersion and signal loss (0.20 to 0.35 db/km) makes it ideal for distances up to 100km. Denoted by Red.
A Class Cable	Double-shielded/triple-shielded Screening >= 85dB (10-1000Mhz) to >=65dB (2000-3000 MHz)
A+ Class Cable	Triple shielded, low LTE interference coaxial cable Screening >= 95dB (10-1000Mhz) to >=75dB (2000-3000 MHz)
AGC	Automatic Gain Control
B Class Cable	Double-shielded Screening >= 75dB (10-1000Mhz) to >=55dB (2000-3000 MHz)
BALUN	Balanced Unbalanced
BII	Business Information Industry
BRANCH	Cable run which branches off the main trunk
CDN	Content Delivery Network – a network of distributed servers that deliver content such as video, images and audio to users based on their geographic location.

TERM	DEFINITION
COFDM	Coded Orthogonal Frequency Division Multiplexing (Digital TV)
Consultant	Subject Matter Expert who can advise on the suitability of the design.
Consumer Feeds	Cable runs from system components direct to an outlet or within the room/apartment space from a local multi-switch
Contractor	Individual or company who is providing components to, or performing part of the work to, deliver the agreed solution.
Contractor (Primary/Managing)	Individual or company who is responsible for the technical delivery of the agreed solution.
DAB	Digital Audio Broadcast
dBuV	Signal strength (voltage) expressed in dB into a specific load impedance
DLP	Defects Liability Period
Down Lead	Cable from reception equipment (satellite / aerial) to head end
DRM	Digital Rights Management
Drop	Cable run from system component to a room or service area
DTT	Digital Terrestrial Television is the transmission of television signals over terrestrial (land-based) broadcast towers
DVB-C / C2	Digital Video Broadcast – Cable (C2 denotes 2nd Generation)
DVB-S / S2	Digital Video Broadcast – Satellite (S2 denotes 2nd Generation)
DVB-T / T2	Digital Video Broadcast – Terrestrial (T2 denotes 2nd Generation)
FC/PC	Fixed Connection (Ferrule Connector) / Physical Contact Fibre Connector
FM	Frequency Modulation

TERM	DEFINITION
G.hn	Networking standard that enables high-speed data transmission (up to 2Gbs) over various types of home wiring such as power lines, phone lines and coaxial cable.
GPON	Gigabit Capable PON
HMDS	Hospitality Media Distribution System
IDS	Interface Definition Specification
IGMP	Internet Group Management Protocol is used to manage the membership of devices in multicast groups and to learn which devices want to receive multicast traffic (and those who don't).
IoT	Network of devices that are embedded with sensors, software and connectivity features enabling them to collect and exchange data over the internet.
IP	Internet Protocol – is responsible for routing data between networks. It sits at Level 3 of the 7-layer model where Level 1 is the physical layer (cables (coax and UTP), RF and fibre), and Level 2 manages device-to-device data transfer (e.g. Ethernet, Wi-Fi).
IPTV	Internet Protocol Television is technology that delivers TV content across/between networks using IP.
IRS	Integrated Reception System (Triax)
LNB (Standard)	Low Noise Block where signals are transmitted using coaxial cables
LNB (Stacked)	Low Noise Block where horizontal and vertical polarisation signals are combined by shifting the horizontal band frequency and stacking on it on top of the (unchanged) vertical band frequency
LTE	Long Term Evolution
MATV	Master Antenna Television
MDS	Media Distribution System is used in various contexts in relation to technology and infrastructure that enables the delivery of media content to consumers across different platforms and devices e.g. Broadcast and Cable Networks, Streaming and internet-based media such as CDN, and In-house Commercial Buildings such as Hospitality.

TERM	DEFINITION
Middleware	Software that connects various, sometimes disparate, systems, enabling communication between them and some control and management (systems dependent).
MMF	Multi-mode Fibre cable is used for shorter distances; it has a larger diameter cable capable of supporting multiple modes of light.
MPTS	Multi Program Transport Stream is a format used in the broadcasting industry to carry multiple programs or streams over on transport stream.
Multicast	Data is transmitted from one sender to multiple receivers (only those interested in receiving the data).
NIT	Network Information Table is transmitted in the DVB data stream and helps receivers understand how to access and organise channels and services.
ONT	Optical Network Terminal / Termination
OTT	Over The Top refers to the delivery of video, audio and other media content over the internet without the need for a traditional cable or satellite service. OTT platforms (e.g. Netflix, Amazon Prime, Disney+) use CDN to distribute content efficiently.
PLC	Power Link Communication is the use of electrical wiring to transmit data. It can be used in a Broadband context (home networking, IPTV, video streaming, and online gaming) and a Narrowband context (low speed connections, IoT).
PON	Passive Optical Network is a fibre network with no active electronics
Project Manager	Responsible to the client for the design, delivery and implementation of the operational system that meets clients' requirements.
QAM	Quadrature Amplitude Modulation (Cable TV)
QoS	Quality of Service
QPSK	Quadrature Phase Shift Keying (Satellite TV)
RTP	Real-time Transport Protocol is specifically design for the delivery of real-time media streams like video, audio, and conferencing/meeting

TERM	DEFINITION
	services. It is built on top of UDP and ensures media streams re delivered with proper timing and synchronisation.
SAT	Site Acceptance Test
SAW	Surface Acoustic Wave
SC	Subscriber Connection
SC/APC	Standard Connector / Angled Physical Contact Fibre Connector
SFP	Small Form-factor Pluggable ports are used for Fibre connections.
SMATV	Satellite Master Antenna Television
SMF	Single-mode Fibre is used for longer distances; it has the smallest diameter cable and uses a single mode of light.
SPLITTER	Used to divide the main signal into two equal outputs, typically with a signal loss of 4.5dB.
SPTS	A Single Program Transport Stream contains only on TV program or video stream
TAP	Used to share the main signal on coaxial cable, with ongoing cable having minimal signal loss.
TRUNK	Main Cable used to connect system components together
UDP	User Datagram Protocol – used in network communications as a transport protocol. It enables fast, lightweight, communications without establishing a connection. It is known as connectionless and unreliable (no guarantee of data delivery)
UHF	Ultra-High Frequency
VHF	Very High Frequency
YAGI	YAGI (-UDA) is a directional antenna used to increase signal reception

3   DESIGN

3.1 DESIGN PRINCIPLES

This specification is based on the Triax IRS TMP, general MATV / SMATV / IPTV components and design concepts.

Alternative designs may be proposed for consideration at the time of tender provided they achieve or exceed that of the documented design and are in line with both this specification and the MATV / SMATV Service Requirements.

3.2 RELEVANT STANDARDS

The installation and materials involved in this specification shall comply with the relevant statuary regulations and requirements of the following New Zealand Standards:

- **AS/NZS 3000** – Wiring Rules
- **AS/NZS 1367** – Coaxial cable and optical fibre systems for the RF distribution of digital television and sound signals in a single and multiple dwelling installations.
- **AS/NZS ISO/IEC 15018:2005** – Telecommunications installations, generic cabling for homes
- **AS/NZS 3080:2013 (ISO/IEC 11801) -** Standard for Structured Cabling
- **Sky Television** – Specification for single and multiple dwelling units (Sky Business - Movielink Version)
- **AS 1417** – Receiving Antennas for Radio and Television in the UHF and VHF Broadcast Range

The contractor is expected to adhere to the latest published edition of all standards and technical documents for all responses and works.

If a conflict exists with the standards or with the scope of works, then the order in the list above shall dictate the order of precedence.

The contractor shall notify the consultant of any conflicts and seek clarification prior to continuation.

3.3 RECEPTION EQUIPMENT

3.3.1   PROTECTION

The contractor shall install lightning/surge protection on the down lead of each satellite dish and antenna. Where antennas are combined, a single protection device may be used.

Antenna protection devices may be mast mounted and will require a 4mm separate earth wire, installed with the downlead to the headend earthing point (or suitable earth bonding point) provided by the electrical contractor.

Satellite protection devices are to be installed internally on the down lead and may be installed in the headend location.

3.3.2   DIGITAL UHF ANTENNA

The digital UHF antenna shall be of a single boom YAGI design and appropriately designed for digital terrestrial reception.

The UHF antenna shell be of a design compliant with LTE filtering.

3.3.3   FM AND DAB ANTENNAS

The FM or DAB antenna shall be a tuned BII-FM or DAB omnidirectional antenna.

Two to five element YAGI style tuned BII-FM or DAB antennas may be used in locations with poor FM reception.

Note: Whilst DAB is not currently used in New Zealand, one should provide the option for future use.

3.3.4   SATELLITE ANTENNAS

Satellite antennas shall be a minimum 80cm solid offset Ku Band dish. Extra satellite antennas maybe added for extra orbital positions where required.

The LNB shall be a Ku Band LNB, 10750 or 11300 Local Oscillator with a noise figure of 0.3dB or less and be LTE / 4G / 5G protected.

3.3.5   ANTENNA MOUNTINGS

Where multiple reception devices, e.g. a satellite dish and an aerial array, are to be installed then, where practical, they should be mounted in a single cluster at a location (or locations) as determined by the contractor in conjunction with the Architect / Project Manager.

Note: Satellite dishes must be installed on their own pole (not a shared pole).

3.3.6   IP DELIVERED CONTENT AND SERVICES

The IP-in port of a suitable headend system will require one 1000 Base-T SFP or Fibre SFP cable connection to a high-speed, on premise, internet access point (from where content is being received from). The connection must support 1000BaseX SerDes (Serialisation / De-serialisation) mode.

Note: care should be taken to ensure there are sufficient ports for IP content In and Out, device/system management, and DRM server connectivity.

3.4 DISTRIBUTION

3.4.1 CABLE RUNS (RECEPTION EQUIPMENT TO HEAD-END)

If cable run (down lead) from the reception equipment to the head-end is:

- Less than 30 meters, A Class Shielded cable shall be used,
- Greater than 30 meters, A+ Class Triple Shielded cable shall be used,
- Greater than 80 meters, single mode fibre shall be used.

Note: it is assumed that the reception equipment for IP delivered content is a headend system and hence no additional cable/cabling is required.

3.4.2 HEADEND

The Headend shall be a 19" rack mountable or wall mountable system. Wall mountable equipment may be mounted on 19" blanking plates or shelves if required.

For digital terrestrial signals that meet the minimum signal parameters (see section 3.5), a channelised programable SAW filtered amplifier with AGC (Automatic Gain Control) shall be used .

For digital terrestrial signals that do not meet the minimum signal parameters, or where a digital terrestrial signal is not available, a digital headend shall be used to regenerate/provide a digital terrestrial signal .

For IP delivered content and services the headend must be capable of receiving both single and multiple data streams and making them available to endpoint devices as required. This should include any necessary scrambling/unscrambling/DRM functionality.

3.4.3 SYSTEM DISTRIBUTION

Distribution and termination using coax/fibre shall be as follows:

- Where only a single outlet is required, a Tap shall be inserted into the trunk feed (if near the signal source) or a Splitter (if at the end of the trunk feed). A feed from a central multi-switch may terminate directly to the outlet.
- Where 2-3 outlets are required, all outlets shall terminate to a 4-way multi-switch or a Tap.
- Where 4-7 outlets are required, all outlets shall terminate to an 8-way multi-switch in the room/cupboard space.

- Where 8 or more outlets are required, all outlets shall terminate on a suitably sized multi-switch in the room/cupboard space.

Distribution and termination using structured cabling (for IPTV delivery) shall be as follows:

- The IP-out port of the headend shall be connected to an appropriately sized, reliable and available, Layer 3 switch with the necessary functionality to securely deliver the content and services required.
- Layer 2 switches will provide the connectivity between endpoint devices (attached via direct cable/cable outlets and wireless access points) and the 'upstream" Layer 3 switch.
- Layer 3 switch to Layer 2 switch connectivity shall be as per structured cabling guidelines.

NOTES:

1. Where a linear/single satellite polarity is required a single Optical or Coaxial Cable may be run for the trunk and consumer feeds.
2. If provision cannot be made to easily install extra trunks or consumer feeds in the future these extra cables must be included in the original build.
3. Most MATV/SMATV/IPTV equipment requires a power supply. The contractor should coordinate power requirements with the electrical contractor in advance.
4. Any cable that joins system components, including the headend, are classed as part of the systems trunk.
5. All coaxial cable used in trunk runs shall be A+ Class Triple Shielded Cable unless under 30 meters in length, then A Class Shielded Cable may be used if desired.
6. Should a trunk length exceed 80 meters or where a trunk run is required to link the headend to a remote node location (second building) then single mode optical fibre shall be used.
7. All optical cables shall be terminated SC/APC (preferred) or FC/PC connectors. Where an optical patch panel is required then the use of either SC/APC (preferred) or FC/PC terminations is acceptable.
8. Cable that runs from system components to room/apartment or other services areas are classed as drops and shall be treated as trunk runs at all times.

9. Cable run from system components direct to an outlet in a room/apartment, or within the room/apartment space from a local multi-switch, are classed as branch runs or consumer feeds. These runs/feeds shall be run using a minimum of A+ Class Shielded Cable, where runs exceed 30 meters. Otherwise, B Class Cable may be used if desired.

10. Multiple Layer 3 switches may be required depending on the network topology.

11. It is possible to use previously installed coaxial cable to transport IP content/data, providing that the structured cabling standards are adhered to and the necessary coaxial to structured cabling adapters are used.

12. It is strongly recommended that a suitably experienced network designer be consulted during the design, procurement and implementation process.

3.4.4   SYSTEM CONNECTORS

System connectors should be from an established manufacturer with a demonstrable performance and durability record.

- Coax connectors shall be of the compression or radial type.

- It is preferred that the connectors and the cable are provided by the same manufacturer. Where this is not the case, compatibility and design suitability should be demonstrated.

- All external connectors must contain an "O" ring and be housed in a weather suitable housing.

- Optical cable shall be terminated using FC/PC or SC/APC connectors or fusion spliced onto FC/PC or SC/APC pigtails.

- All fibre terminations/splices shall be protected in a suitable fibre tray.

3.4.5   WALL OUTLETS AND TV CONNECTORS

All connectors and wall plates must use F-type connectors for Satellite signals. TVs can be connected via F-type connector, the standard/traditional TV aerial connector, or RJ45 connector (where applicable).

The contractor must discuss and agree the presentation/finish of the outlets / connectors with the architect/project manager.

3.5 SIGNAL LEVELS

The signal required at the headend, incoming from reception equipment and at the outlets shall fall within the range specified in the international DVB Standards as outlined in the table below.

Source	Signal Level	Modulation Error Rate	Bit Error Rate	Multiplex
DVB-T/T2	50 - 60dBuV	>29dB		The flatness as viewed on a spectrum analyser shall not vary by more than 5dBuV from highest to lowest point.
DVB-C	50 – 60dBuV	>29dB		The flatness as viewed on a spectrum analyser shall not vary by more than 5dBuV from highest to lowest point.
DVB-S/S2	60 - 70dBuV		>1.0E-4	

3.6 SUGGESTED PRODUCTS/COMPONENTS

Component / Component Level	Suggested Product(s)
Satellite Receiver	• Triax TD Dish Range
UHF Receiver	• Digi LTE 700. (6,10,14, 18 element) • Wolsey LTE 700 (10 element); 5G protection
FM Receiver	• Triax FM Omnidirectional Aerial • Triax FM Antenna (3-element)
Lightning Arrestor	• Starview SATLA (47-3500Mhz)
Satellite Amplifier	• Triax TSWA1

Component / Component Level	Suggested Product(s)
	• Triax Wideband Amplifier V/H TSWA
Terrestrial Amplifier	• Triax TMB 1700 • Ikusi NBS-804-C48
Combined Satellite & Terrestrial Amplifier	• Ikusi SAE-912 (1xTV & 1xIF inputs) • Ikusi SAE-920 (1xTV & 2xIF inputs) • Ikusi One+ SAT
Headend Systems	• Triax TDcH / Triax TDmH • Axing MK 08-xx • Ikusi Flow
Optical Transmitter	• Triax TOST • Triax TOCT • Ikusi FTD Series (e.g. 1290)
Optical Splitter	• Triax TOS Series • Ikusi FSP Series
Coax Splitter	• Triax SCS Series • Ikusi UDF and DFC Series
Fibre to Coax Converters	• Triax TWOC • Ikusi FRD
Optical Tap	• Triax TOS02D – 2080 and 3070
Coax multi-switch	• Triax TMS and TMM ranges
Coax Tap	• Triax SCT, TMS ranges • Starview ST1, ST2, ST4, ST6, ST8
Layer 3 Switch	• Switches which can be managed, supported, have high MTBF, meet expected performance throughput, can meet Vlan, QoS, IGMP (Multicast) and security requirements etc., and easily integrate to customer systems (where existing).

Component / Component Level	Suggested Product(s)
Layer 2 Switch	• Switches which can be managed, supported, have high MTBF, meet expected performance throughput and QoS, and easily integrate to existing customer systems (where existing).
Wi-Fi	• Access points which can be managed, supported, have high MTBF, meet expected performance throughput and QoS (sufficient access points must be installed), and easily integrate to customer systems (where existing).
TVs for IPTV	• Hospitality grade systems from Samsung, LG and Phillips
DRM	• Pro:Idiom (LG), • VSecure (Philips) • Widevine, PlayReady, Veramatrix (Samsung LYNK)
G.hn Connectivity	• Maxlinear and Devolo offer the most complete solutions. • Tp-Link and Zyxel also offer products.

4 TESTING

4.1 TEST PLAN

A test plan shall be developed and provide the sequence of testing to be conducted.

This testing plan shall be followed post alterations to the installed system to verify compliance with both the original specification and original site acceptance tests.

To maintain test plan currency and integrity any changes to the system must reflected in the site documentation, manuals, plans and diagrams.

4.2 PRODUCT TESTING

Testing of all 'Of the Shelf' electrical and electronic products shall be conducted prior to shipping and delivery to site.

Tests shall be sufficient to prove products are fully functional with respect to their intended duty within the final installed system.

Test results shall be submitted prior to the shipping and delivery of the products to site.

4.3 COMMISSIONING RECORDS

The MATV/SMATV contractor is required to submit a commissioning record for each outlet. The commissioning list shall detail each outlet's signal and function and indicate pass/fail result.

In addition to the commissioning list the MATV/SMATV/IPTV contractor shall submit details of the tests performed.

Conduct commissioning testing prior to integration with the various systems including:

- Cable integrity
- Gender of outlets
- Labelling
- Cable continuity; and
- Isolation of cable screens for building earth.

4.4 INSTALLATION INSPECTIONS

Comprehensive visual inspections of all installed items shall be completed and documented to ensure the installation is:

- In accordance with the manufacturer's recommendations
- In accordance with the agreed specification

- Neat and tidy

- Has suitable access for maintenance.

The inspection report shall be signed by the MATV/SMATV/IPTV contractor and submitted to the project manager.

4.5 SITE ACCEPTANCE TESTS

Comprehensive Site Acceptance Tests shall be undertaken of the final installed system. These tests shall unambiguously demonstrate the expected operation of the system under normal operational conditions.

Should tests deviate from the test plans and procedures, the MATV/SMATV/IPTV contractor shall be required to update the test plan (as per submission schedule) and have the update signed off by the project manager.

Installation inspections and commissioning tests shall be completed, documented and signed off by the MATV/SMATV/IPTV contractor for all items included within the site acceptance tests in accordance with the submission schedule.

Site acceptance tests shall be signed off by the primary contractor and provided to the consultant, project manager, systems designer and clients in accordance with the submission schedule.

Upon successful completion of all tests to the satisfaction of the principal contractor the MATV/SMATV/IPTV contractor shall issue two hardcopies and one electronic copy of the completed test documentation to the project manager.

5   DOCUMENTATION AND LABELLING

5.1 GUIDES

The MATV/SMATV/IPTV contractor shall submit an installation guide, user guide and administrators guide, where applicable, covering the provided systems.

If referenced documents or technical sections require that manuals be submitted, include the corresponding material in the administrators' guide.

5.2 LABELLING

All system devices shall be fitted with a printed label identifying the device.

All cables within a riser or connecting to a distribution panel shall be clearly labelled (with permanent labels) to identify its source and destination.

All distribution panel covers shall be clearly marked and permanently labelled 'MATV System'.

Warning and Cautions shall be included to emphasize conditions hazardous to personnel or equipment, giving instructions to avoid the hazard.

The format shall be:

CAUTION: Testing procedure must be followed to avoid damage to equipment

WARNING: Testing procedure must be observed or risk loss of life or injury to personnel.

5.3 SYSTEM FUNCTIONAL DESCRIPTION

The contractor shall:

- Prepare and submit documentation to describe the functions of the system. The document shall demonstrate that the system meets the functional performance requirements listed in this specification.

- Bring to the attention of the consultant and client any discrepancies between the functional performance of the installed system and this documentation.

6   QUALITY CONTROL

6.1 SAMPLES

The following physical samples shall be provided for approval of the managing contractor by the contractor(s) prior to procurement:

- MATV/SMATV/IPTV connection plates

- Connectors and Cable

- Aerials and Satellite Dish/LNB

6.2 CHANGES

The following principles will apply:

- All changes required to take place during the system installation phase, must be submitted to, and signed off, by the project manager.

- The functional description shall be submitted and approved prior to any control system programming.

6.3 DOCUMENTATION

Authors and compilers shall have:

- Demonstrable experience in the maintenance and operation of the equipment and systems installed,

- Demonstrable editorial ability.

7 SUPPORT AND MAINTENANCE

7.1 TECHNICAL ASSISTANCE

During the warranty period, the contractor shall provide technical assistance and advice to the project managers staff regarding the operation and maintenance of the equipment.

7.2 DEFECTS LIABILITY

The defects liability period (DLP) requires support for twelve months commencing on the successful completion of site acceptance testing for all equipment.

During the DLP the contractor shall:

- Perform any required maintenance, inspections and tests,
- Comply with authority requirements (see the Relevant Standards),
- Rectify onsite, within one working week, failures affecting general use of MATV/SMATV/IPTV equipment,
- Replace or repair all parts as required to meet the rectification response criteria for the duration of the DLP,
- Hold sufficient spares to mitigate long equipment lead times (ensuring response/rectification criteria can be met)

## 7.3 MAINTENANCE

The MATV/SMATV contractor must:

- Submit details of maintenance procedures and program (relating to installed systems and equipment) in accordance with the submission schedule,
- Indicate dates of service visits,
- Provide contact telephone numbers of service operators,
- Describe arrangements for emergency calls.

8   LICENCES AND WARRANTIES

The MATV/SMATV/IPTV contractor must:

- Provide all licenses and warranties pertaining to any hardware supplied,

- Provide all licenses and warranties pertaining to any software supplied,

- Register warranties in the name of the site with the manufacturer where necessary,

- Retain copies of warranties and licenses delivered with components and equipment.
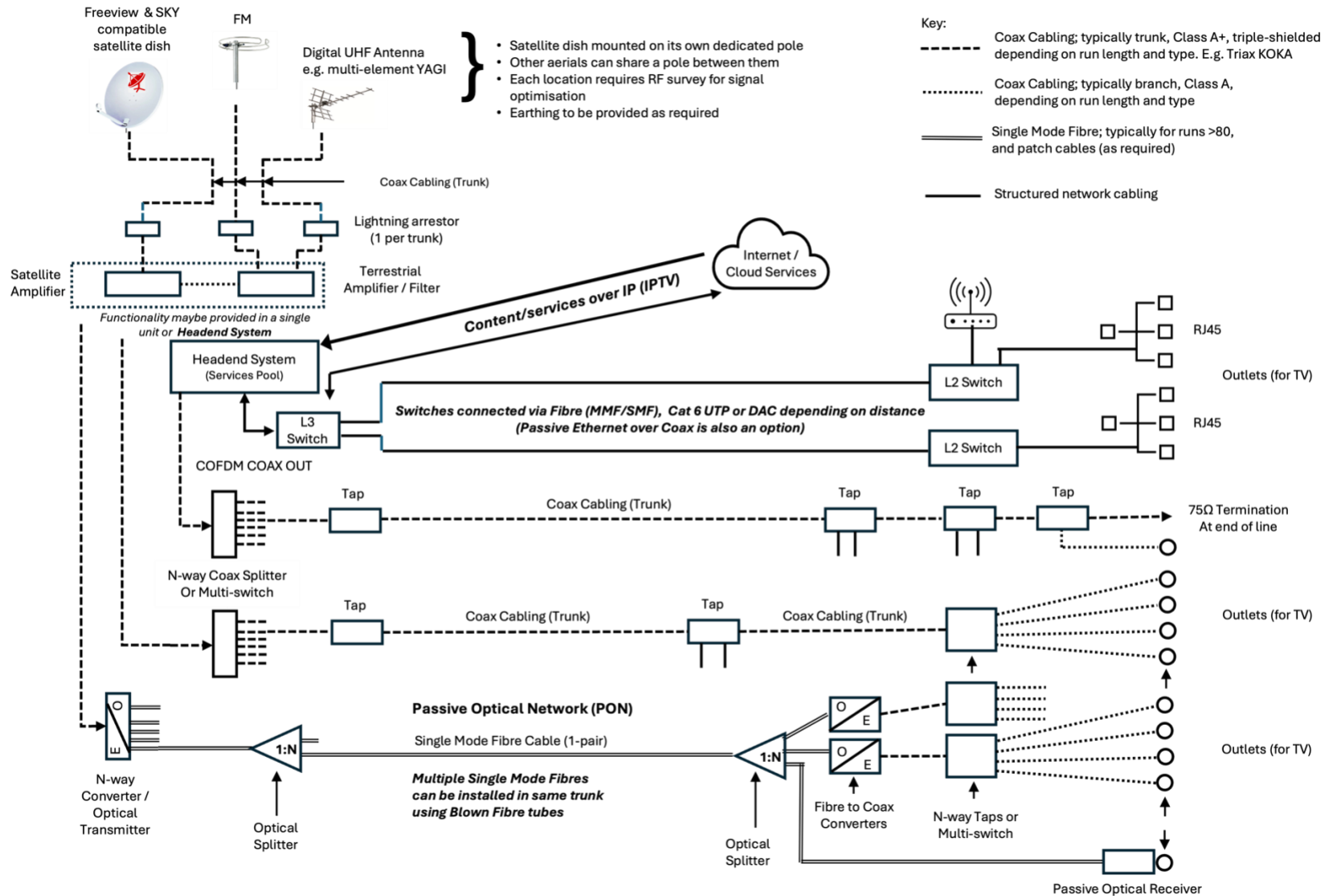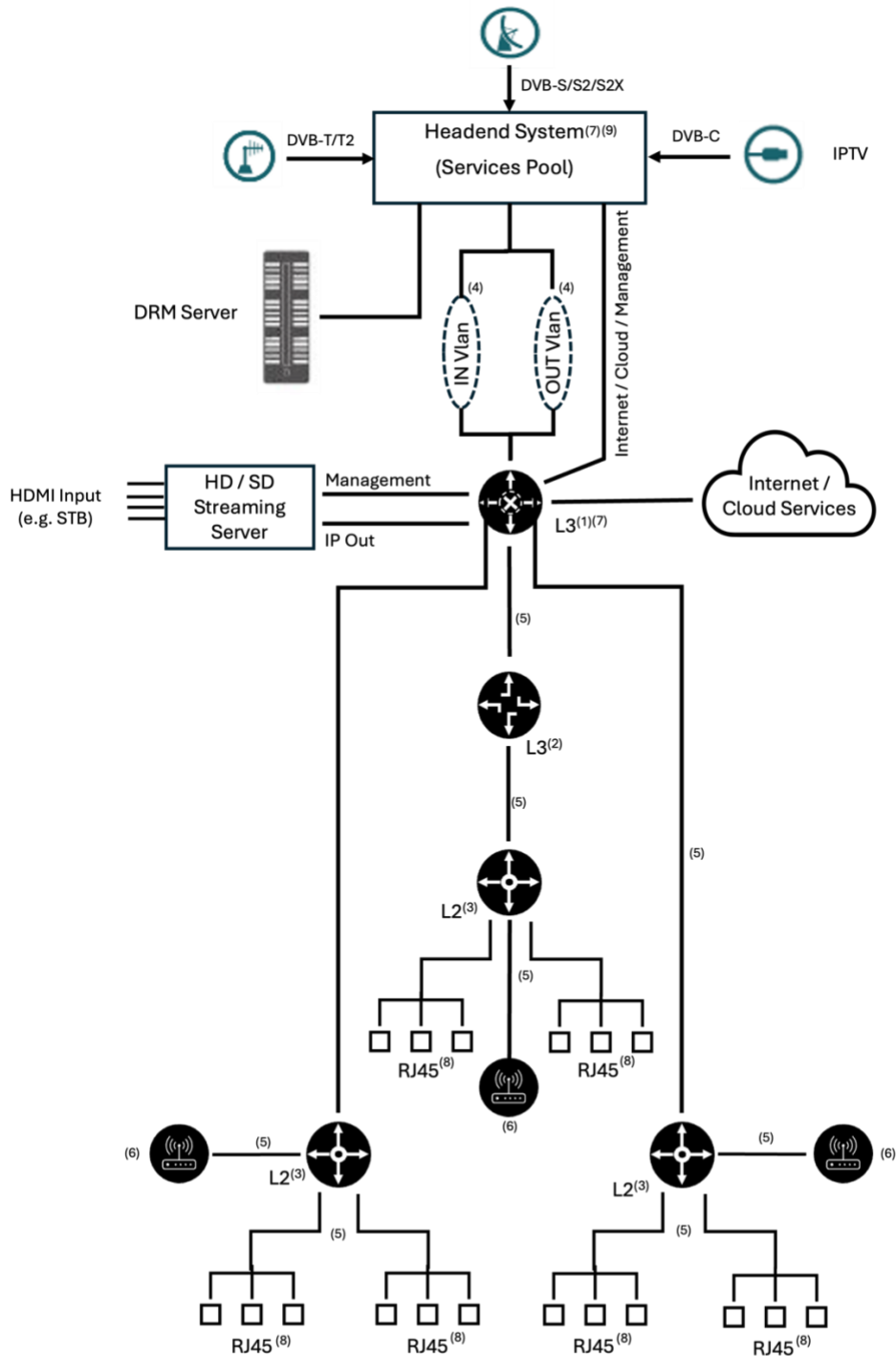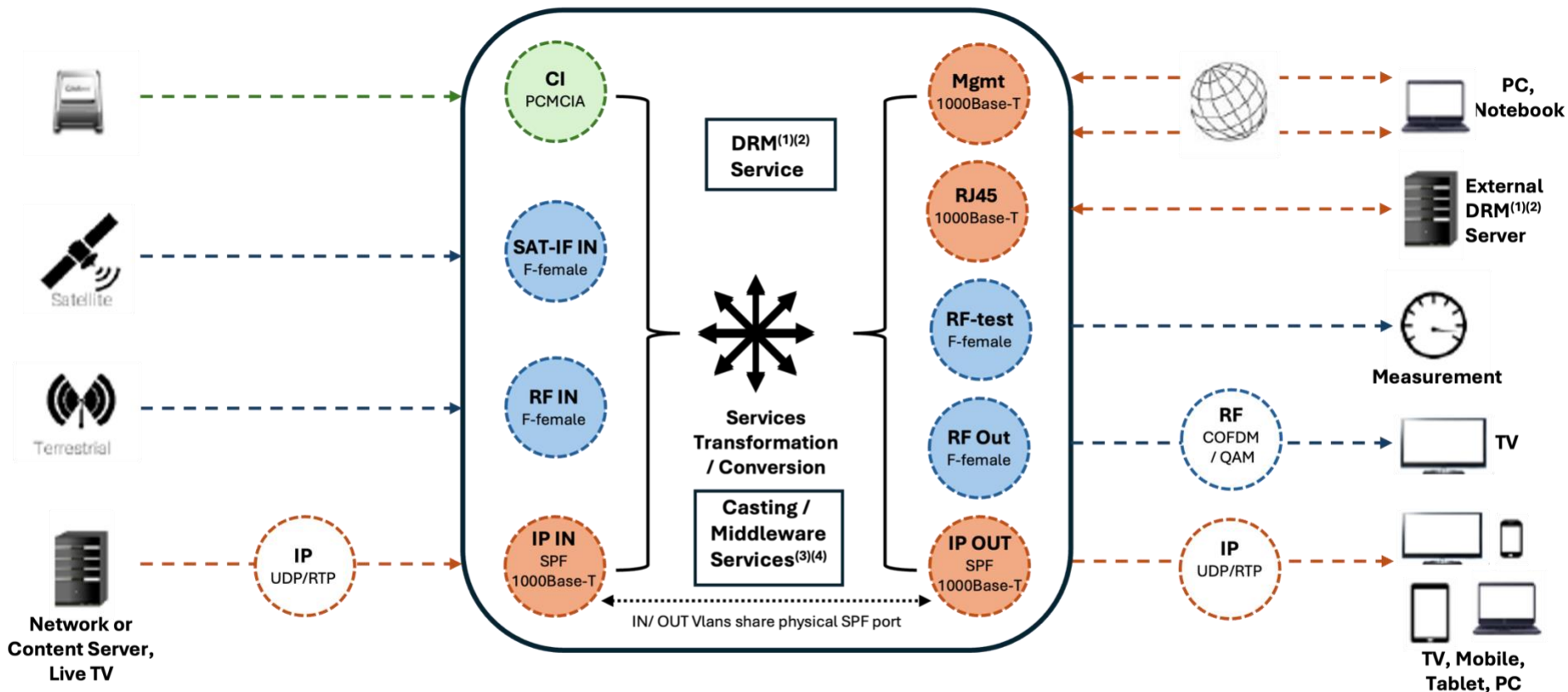
Notes:
1. Layer 3 Switch / Router / Firewall / Security
2. Layer 3 Switch (internal distribution, Vlan, QoS, ICMP etc.)
3. Layer 2 Switch (Vlan, QoS, ICMP etc.)
4. Vlans recommended for IP In and IP Out traffic
5. Structured Cabling (choose for approved distribution (Fibre – SMF/MMF, Cat 6 UTP, EOC Passive etc.) according to topology)
6. WiFi Access Points quantity/specification must be sufficient to meet minimum requirements for IP streamed services
7. Multiple devices may be required depending on overall data throughput
8. RJ45 sockets provide ethernet connectivity for computers, tablets, smart TV and smart monitors etc.
9. Includes CAM / CI functionality
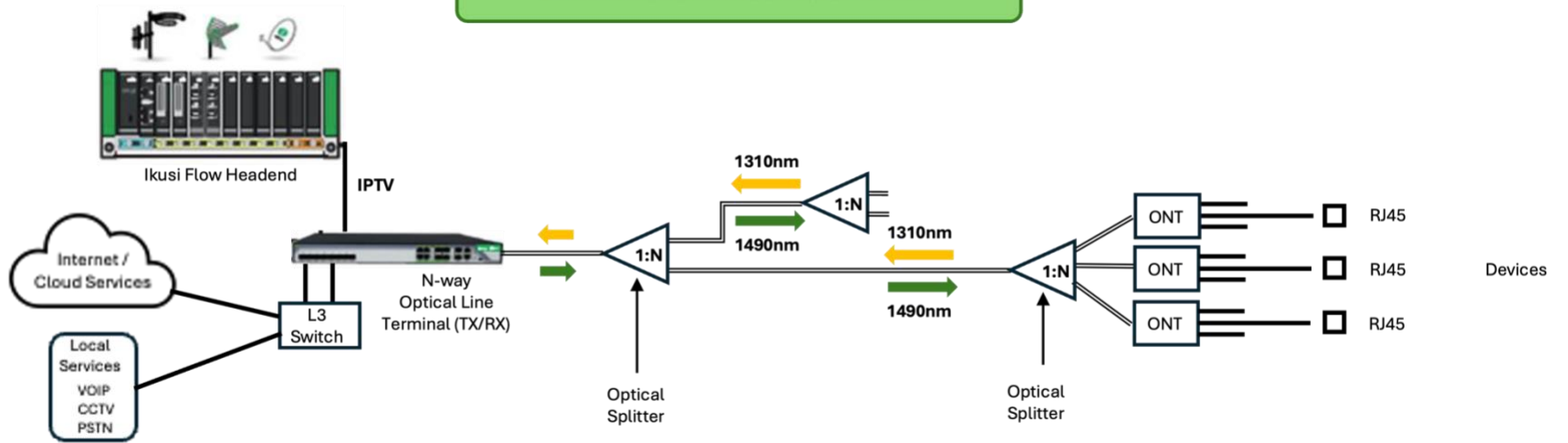
Triax TDmH / TDcH

Notes:

1. DRM is required for Sky over IPTV
2. DRM Service may be provided internally (license required) or via ethernet connected DRM Server (license required)
3. Casting Service and/or Device Management may be provided internally or via ethernet connected casting and middleware server(s)

APPENDIX D.   GENERIC GPON WITH RF OVERLAY EXAMPLE

GPON: EXAMPLE SCENARIO

GPON: WITH RF OVERLAY