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ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.9802

Amendment 1
(08/2015)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Access networks – Optical line systems for local and
access networks

Multiple-wavelength passive optical networks
(MW-PONs)

Amendment 1

Recommendation ITU-T G.9802 (2015) – Amendment 1

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Recommendation ITU-T G.9802

Multiple-wavelength passive optical networks (MW-PONs)

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T G.9802 (2015) continues the maintenance and evolution of the specification of multiple wavelength passive optical network (MW-PON) systems as defined in Recommendation ITU-T G.9802 (2015).

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.9802	2015-04-06	15	11.1002/1000/12398
1.1	ITU-T G.9802 (2015) Amd. 1	2015-08-13	15	11.1002/1000/12540

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T G.9802

Multiple-wavelength passive optical networks (MW-PONs)

Amendment 1

1) Scope

This amendment continues the maintenance and evolution of MW-PON specification as defined in Recommendation ITU-T G.9802 (2015).

2) Clause 2

Add the following reference to clause 2:

[ITU-T G.989.2] Recommendation ITU-T G.989.2 (2015), *40-Gigabit-capable passive optical networks 2 (NG-PON2): Physical media dependent (PMD) layer specification.*

3) Clause 6.2.1 – Addition of a clarification sentence

Replace text of clause 6.2.1 with the following (the underlined sentence is added):

6.2.1 ODN

There can be several types of ODN architectures to achieve service distribution in MW-PON. Figures 6-3 and 6-4 show examples of MW-PON with power-splitter-based ODN. Figures 6-5 and 6-6 are examples of MW-PON with wavelength-mux (demux)-based ODN. Figure 6-7 is an example of MW-PON with an ODN consisting of power splitters and multiple feeder fibres. Figure 6-8 is an example of MW-PON with an ODN consisting of an NxM wavelength mux (demux) and multiple power splitters. Note that the burst mode receiving capability may be required at the ONUs in the architecture shown in Figures 6-5 and 6-7.

Figure 6-9 is a reference diagram of MW-PON with Type C protection and an ODN of one-stage power or wavelength mux (demux). Figure 6-10 is a reference diagram of the MW-PON in Figure 6-9 with a two-stage splitter ODN. Figure 6-11 is an example of MW-PON with wavelength muxs (demuxs) at the OLT and at the ODN.

Note that Figures 6-3 to 6-11 simply provide reference examples of the ODN architectures. They are not intended to limit designs and implementations of OLTs and ONUs. In addition, the designs and implementations of MW-PON OLT and ONU are outside the scope of this Recommendation.

Also note that this Recommendation recognizes ODN architectures with multiple stages. Each stage can be a different type of ODN configuration depending on the chosen technology.

4) Annex B

Add the following annex as Annex B:

Annex B

Multiple wavelength PONs with WM-based ODN

(This annex forms an integral part of this Recommendation.)

B.1 Reference architecture

Figure B.1 depicts the functional optical access network architecture and reference points that apply to an MW-PON system with WM-based ODN. The ODN consists of the WM for the multiplexing/demultiplexing of the point-to-point WDM PON (PtP WDM) channels and, optionally, reach extenders may also be used in the ODN. Wavelength signals from multiple OLT CTs are multiplexed by a WM at the SR-CG reference point. The WM at ODN directs different wavelength signals to different distribution fibres. Each ONU is served by a dedicated pair of downstream and upstream wavelengths. There is no wavelength sharing among ONUs.

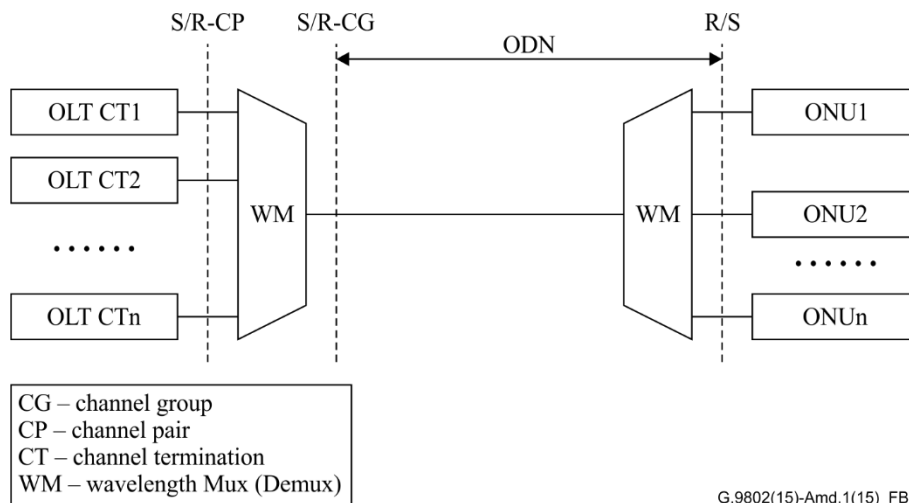


Figure B.1 – Reference configuration of MW-PON with WM-based ODN (WM only)

Figures B.2 and B.3 depict MW-PON systems with ODNs consisting of one power splitter and two WMs. The ODN may optionally use reach extenders. In Figure B.2, the first WM is marked as WM1. WM1 is used for the Multiplexing/Demultiplexing of legacy system and PtP WDM channels. The second WM is marked as WM2, and is for the multiplexing/demultiplexing of PtP WDM channels. In Figure B.3, the power splitter forms the first stage of ODN. WMs are used as the second stage for the multiplexing/demultiplexing of PtP WDM channels. Configurations in Figures B.2 and B.3 support PtP WDM system coexistence with legacy systems.

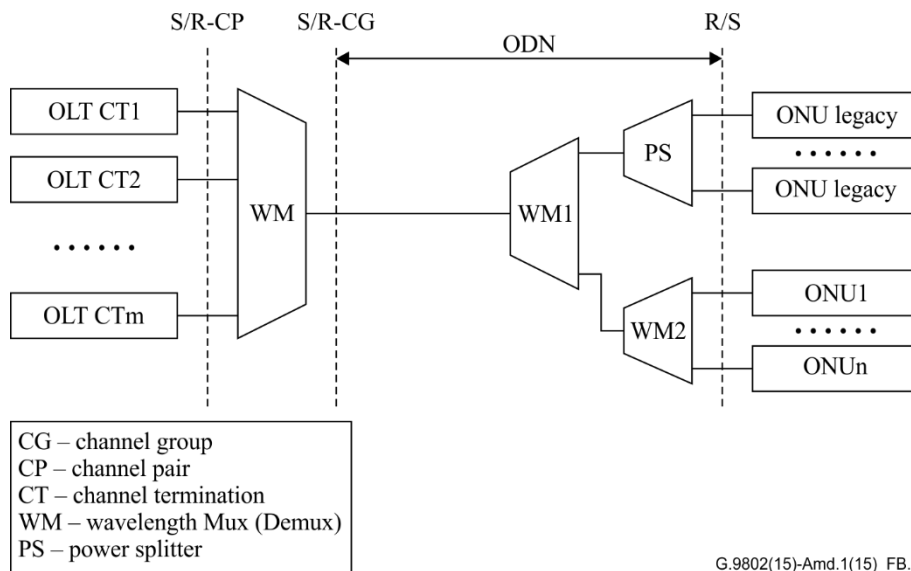


Figure B.2 – Reference configuration of MW-PON with WM-based ODN (WM then power splitter)

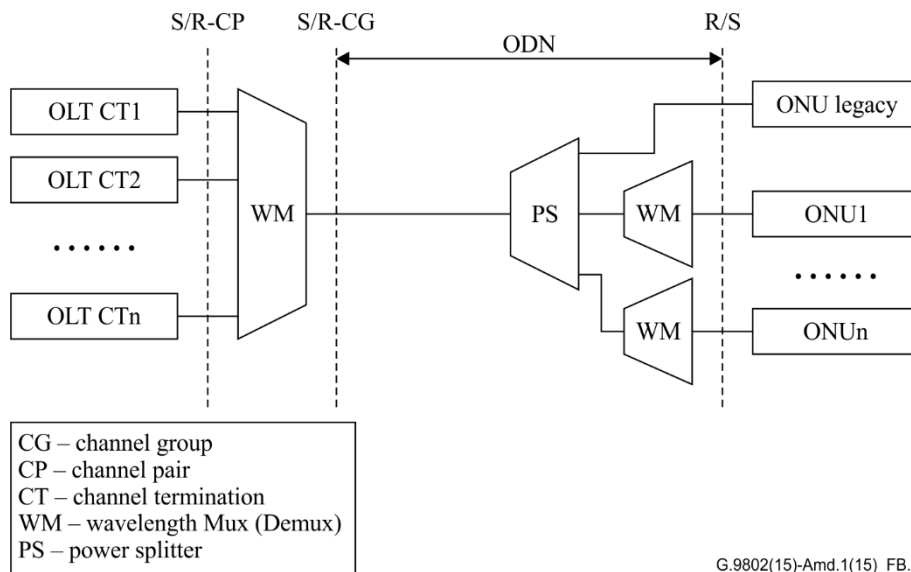


Figure B.3 - Reference configuration of MW-PON with WM-based ODN (power splitter then WM)

Figure B.4 depicts an MW-PON system with an ODN consisting of a WM and a reflector unit. The WM is used for the multiplexing/demultiplexing of PtP WDM channels. The reflector unit is marked as PR_u. It is transparent for downstream wavelength signals and partially reflective for upstream wavelength signals. The reflector unit is employed for the reference of upstream wavelength initialization and alignment of PtP WDM channels. This type of partially reflective unit can also be employed at the common port of WMs in Figures B.2 and B.3, for the same purpose of wavelength initialization and channel alignment.

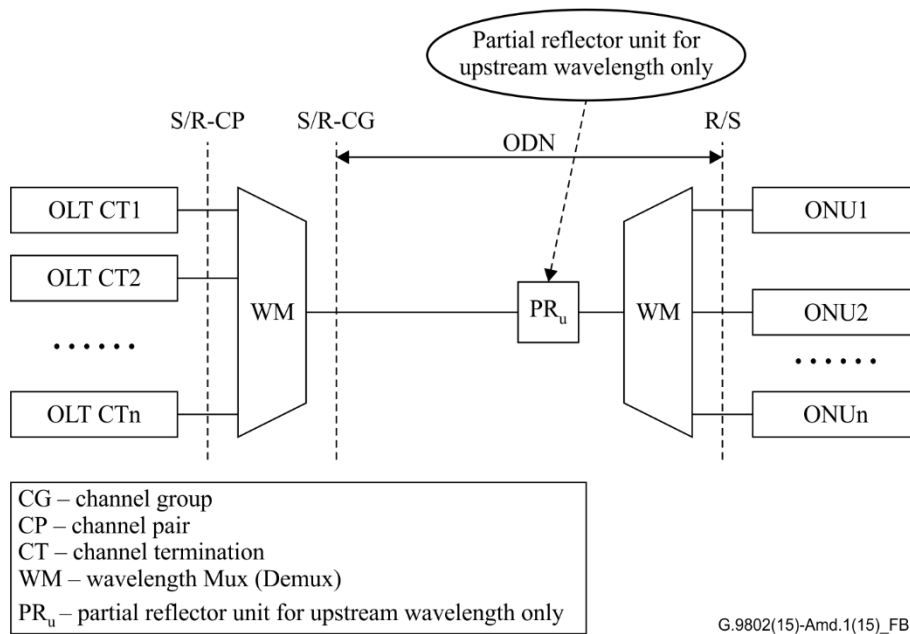


Figure B.4 – Reference configuration of WM-based ODN with reflector unit

B.2 Wavelength assignment

In an MW-PON system with WM-based ODN, the ONU downstream and upstream wavelengths are assigned by the WM design. Wavelength assignment via protocol transmission is not required.

B.3 Wavelength tuning

In an MW-PON system with WM-based ODN, wavelength tuning may apply in ONU activation. During ONU activation, the OLT CTs would announce the wavelength channel pair information in the downstream management channel. Only one set of downstream and upstream wavelengths are directed and available for an ONU. A new ONU would first achieve downstream synchronization. An ONU with a tunable receiver scans available downstream wavelength channels to achieve downstream synchronization. An ONU without a tunable receiver synchronizes to the downstream wavelength channel configured by the WM in the ODN by skipping the downstream wavelength scanning. The ONU obtains its channel pair information from the downstream management channel. It tunes the upstream wavelength as the OLT CT instructs. After the upstream transmission is successfully established, the ONU and the OLT CT enters normal operation.

Note that there are several options to support the management channel. Annex B of [ITU-T G.989.2] specifies transparent AMCC, which employs an auxiliary signal to transport the management information. Annex G of [ITU-T G.989.3] specifies transcoding AMCC, which embeds management information into user data by improving user data coding efficiency.

Wavelength tuning is not required after an ONU is activated for operation.

B.4 Wavelength resource administration

In an MW-PON system with WM-based ODN, a logic ID representing the association of downstream and upstream wavelength channels is helpful in ONU activation. An ONU could obtain its assigned upstream wavelength channel information from the downstream management frames.

B.5 Wavelength channel performance supervision

In an MW-PON system with WM-based ODN, the WM directs wavelengths to their optical paths and provides isolation among wavelength channels. This facilitates failure detection and performance supervision by monitoring the corresponding wavelengths.

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