

Possible Approach to Select a Wavelength Plan

Keiji Tanaka and Yukio Horiuchi
KDDI R&D Labs. Inc.

Key issues in designing an optical access system are as follows:

- **Performance**

- Throughput / Latency
- QoS
- Functionalities

} These two may be out of scope of this project.

- **Cost**

- Overall system cost; one OLT & >16 ONUs
- Footprint at COs
- Power consumption

- **Backward compatibility**

- Coexistence with RF-video systems
- **Coexistence with 1Gbps EPON**

What should we do?

Signal wavelength for US/DS is the most important factor in the system design because it is closely associated with

- Optical transmission performance,
- Optical components,
- Backward compatibility.

We **deliberately** need to decide the wavelength plan by investigating its impact on performance, cost, backward compatibility, and so on.

First, we should consider the way to investigate the best system configuration for 10GE-PON **systematically**, and then summarize the results of the study so as everyone to make a decision of the best system and technologies.

Step1 : List all the feasible wavelength in the following four cases:

- Green field deployment
- Coexistence with RF-video
- Coexistence with 1Gbps EPON
- Coexistence with both RF-video and 1Gbps EPON

Step2 : Consider the following issues for each wavelength:

- Modulation scheme: direct or external
- Feasible power budget and system length
- Transmission characteristics associated with wavelength, optical components, and FECs
- Cost in the cases of 16-, 32-, and 64-split
- Impact on backward compatibility (BC)

Step3 : Narrow the feasible wavelength plan

Candidates of US/DS wavelength

	Green field	w/ RF-video	w/ 1G-EPON	w/ Both
Upstream [μm]	1.31	1.31 (TDM) 1.45 (WDM) 1.5x (WDM)	1.31 (TDM) 1.45 (WDM) 1.5x (WDM)	1.31 (TDM) 1.45 (WDM) 1.5x (WDM)
Downstream [μm]	1.49 1.55	1.49 (WDM)	1.45 (WDM) 1.5x (WDM)	1.53/1.57 (WDM)

Summary of study

Upstream	1.31	1.45	1.5x (C)	1.5x (L)
Modulation	Direct		External	External
Power budget				
Cost				
Impact on BC				

Downstream	1.45	1.49	1.5x (C)	1.5x (L)
Modulation			External	External
Power budget				
Cost				
Impact on BC				