

# Investigation of Spectral Slicing Technology in WDM-PON Systems.

Valentina Zaiceva<sup>1</sup>, Vjaceslavs Bobrovs<sup>1</sup>

<sup>1</sup>*Institute of Telecommunications, Riga Technical University, Riga, LV-1048, Latvia*  
 e-mail: Valentina.Zaiceva@rtu.lv

Nowadays demand of bandwidth rapidly grows. WDM-PON systems allow effectively use spectral bandwidth but one of the main disadvantages of these systems is high costs because of unique network's component for each subscriber. To prevent such problem Spectral Slicing technology widely is used. This technology can provide one common optical source which spectrum is sliced in portions according to defined wavelength and provided to subscribers therefore not necessary to use special optical sources for each channel. [1, 2].

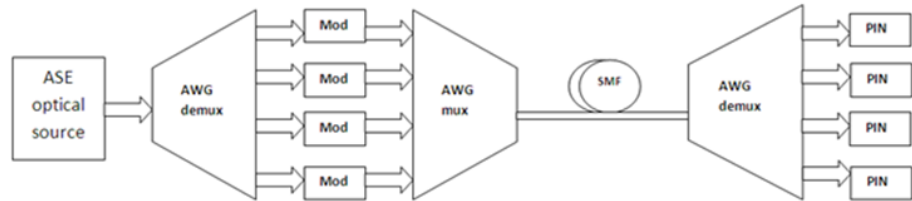


Figure 1. Scheme of WDM-PON System used ASE source for Spectral Slicing

Performed researches of Spectral Slicing Technology show that there was achieved 2.5 Gbit/s bit rates for LED and ASE sources. It is difficult to achieve higher bit rates because of cross-modulation effect and noises between spectral components. In this research 100 GHz optimal channel spacing is chosen. As a broadband light source is chosen ASE source because of its higher power characteristics. Four channel system was investigated for 622Mbit/s, 1.25 Gbit/s and 2.5 Gbit/s bit rates. Simulations scheme which was performed in OptSim software is shown in figure 1. For Flat-top type AWG demultiplexor results are summarized in Table 1.

Table 1. WDM-PON System performance for 2.5 Gbit/s, 1.25 Gbit/s, 622 Mbit/s data bit rate

2.5Gbit/s				1.25Gbit/s				622Mbit/s			
BER	Input Power (dBm)	Output Power (dBm)	L max (km)	BER	Input Power (dBm)	Output Power (dBm)	L max (km)	BER	Input Power (dBm)	Output Power (dBm)	L max (km)
1.42e-10	-0.40	-3.52	16	2.41e-16	-0.40	-3.46	68	1.13e-18	-0.26	-3.31	90
2.94e-12	-0.66	-3.69		8.49e-18	-0.52	-3.59		1.78e-32	-0.58	-3.66	
3.69e-12	-0.79	-3.85		4.14e-14	-0.79	-3.86		1.85e-20	-0.68	-3.78	
7.39e-12	-0.91	-3.96		4.72e-18	-0.79	-3.85		2.5e-18	-1.01	-3.97	

To sum up, WDM-PON System's performance is better for 622 Mbit/s data bit rate where BER in worst case is around  $10^{-18}$ . At 2.5 Gbit/s data bit rate system's performance is worse than for 622 Mbit/s and 1.25 Gbit/s but anyway it still satisfy BER mentioned in ITU-T G.984.2. Recommendation.

## References

1. S.Taebi, *Effect of AWG Filtering on Spectrally Sliced WDM PONs*, Dept.of Electrical and Computer Engineering, Univ.of Waterloo, 2011.
2. N.Ahmed, *Investigate Spectrum-Sliced WDM System for FTTH Network*, School of Electrical Systems Engineering, Univ. Malaysia, 2011.