



Fig. 11. (a). and (b). BER curves for DS and US, both showing error free operation

5. Summary and conclusion

We have presented a novel dual feeder fiber technique to mitigate the effects of spontaneous Raman crosstalk during simultaneous transmission of classical and QKD optical communication channels. This technique has enabled the first demonstration of 10GHz-clock rate, C-band-based DPSK QKD on a WDM-PON with negligible cross-talk penalties. We identified spontaneous Raman scattering as the main noise mechanism that degrades the performance of the quantum channels, preventing secure operation of a standard single feeder network. We have briefly described the characteristic of spontaneous Raman spectrum and presented a model to quantify the impact of spontaneous Raman noise in a WDM-PON. With bi-directional 10Gb/s US and DS conventional data traffic running error free, QKD transmission was demonstrated for 4 users. The mean QBER value was 3.5% with a mean raw key distribution rate of 1.3Mb/s, which decreased to 696kb/s after temporal windowing to reduce inter-symbol interference due to single photon detector timing jitter. The mitigation scheme is protocol transparent and hence is also applicable to other QKD protocols such as BB84 [1].

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