Ingenious Dynamics

Technical experiment for downstream B++ power budget

2007.09

Shinji Tsuji
Sumitomo Electric

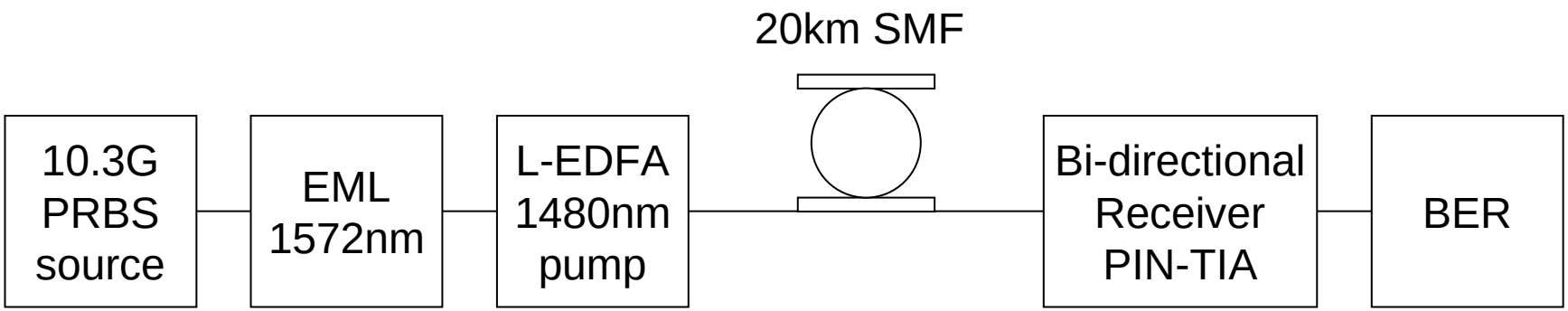
Object

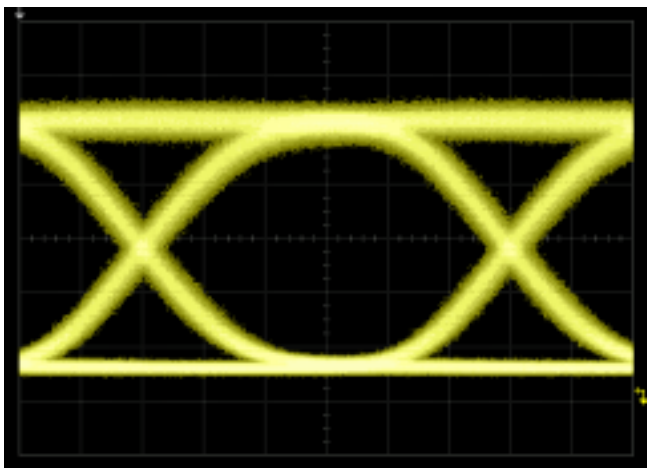
- Experiment of discussed downstream power budget with
  - Optical amplifier at OLT
  - PIN receiver at ONU

Launch power	10~13dBm
Extinction ratio	>9dB
Sensitivity	-20dBm@10^{-3}

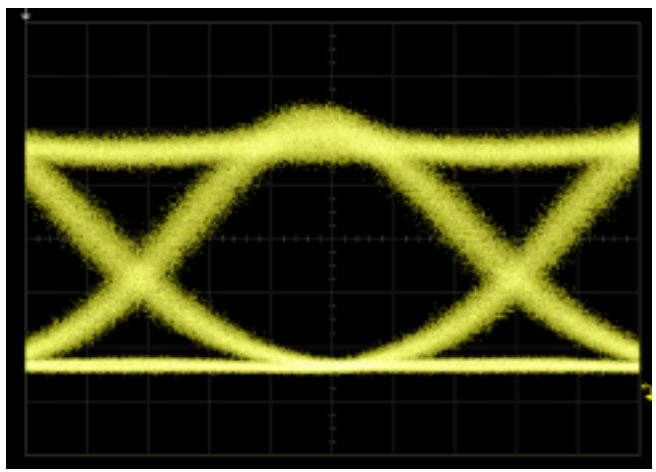
- Estimate the technical parameters
  - Transmitter performance
  - Receiver performance

Setup



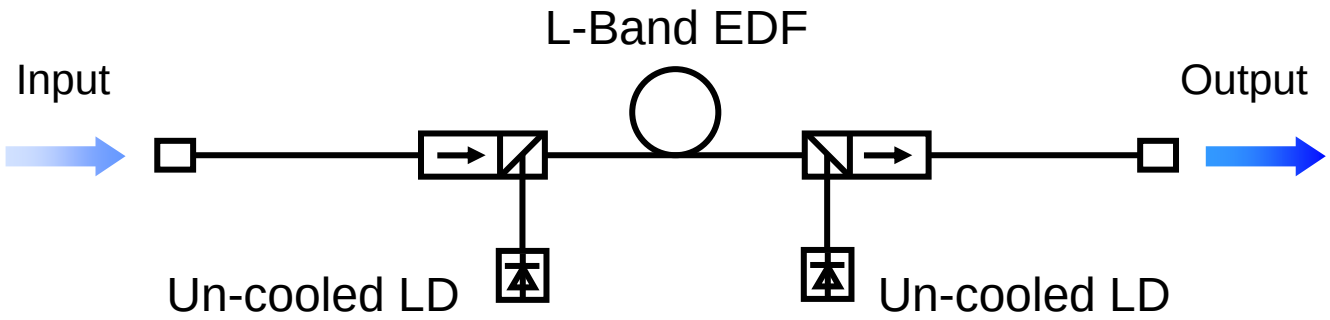


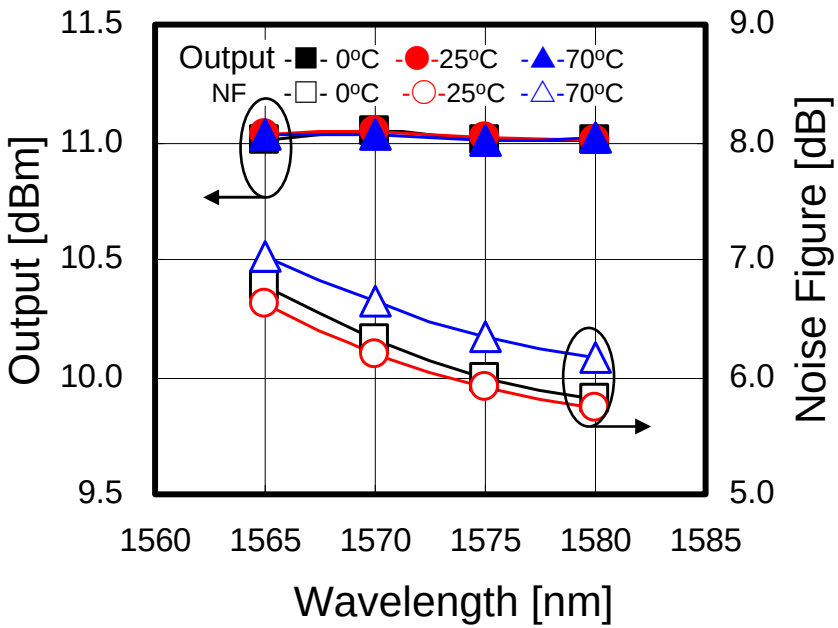
- OLT output (with filter)
- Power: 11.5dBm
- Extinction ratio: 10.1dB

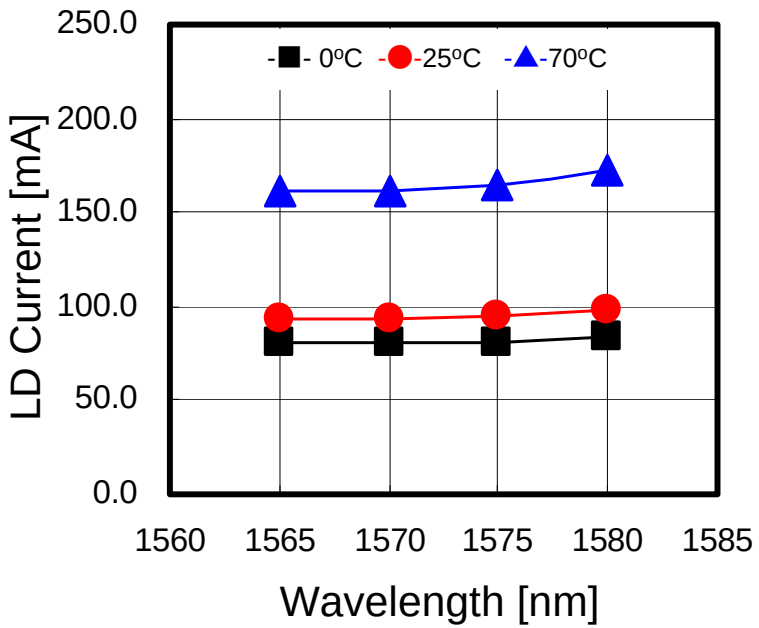


- Transmitted after 20km (with filter)

L-band EDFA


L-Band EDF
Input
Output
Un-cooled LD
Un-cooled LD


Output -■- 0ºC -●-25ºC -▲-70ºC
NF -□- 0ºC -○-25ºC -△-70ºC
Output [dBm]
Noise Figure [dB]
11.5
11.0
10.5
10.0
9.5
9.0
8.0
7.0
6.0
5.0
1560
1565
1570
1575
1580
1585
Wavelength [nm]


-■- 0ºC -●-25ºC -▲-70ºC
LD Current [mA]
250.0
200.0
150.0
100.0
50.0
0.0
1560
1565
1570
1575
1580
1585
Wavelength [nm]

L-band EDFA

Ingenious Dynamics

- Test module specification

Item	Specifications
Wavelength	1565 to 1580nm (Single channel)
Input Power	-3 ~ 3 dBm
Output Power	> 11 dBm
Noise Figure	< 7.5 dB
Size	70 x 95 x 12 mm (w/o swelling)
Power Consumption	Typ. 1W

Future business card size

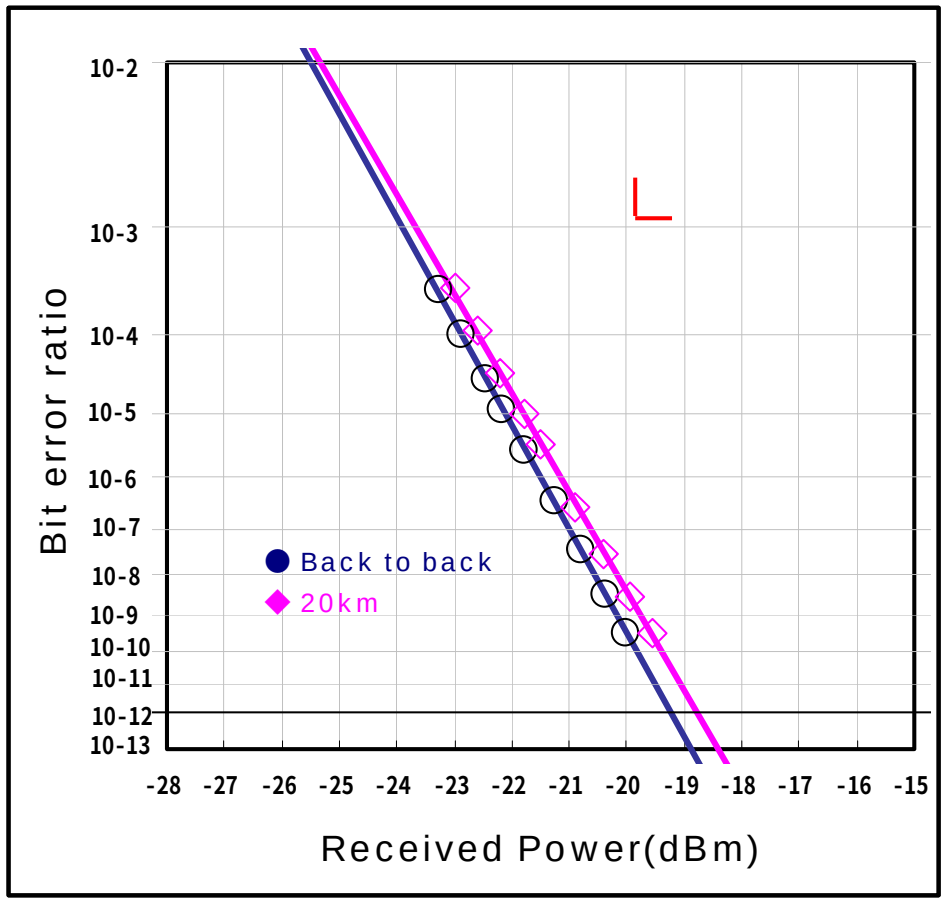
Power consumption
at this test was 210mW.

Bi-directional Receiver

Ingenious Dynamics

- Modified bi-directional module with PIN and 10G TIA
- LD 1310nm
- Directional filter implemented

- Bi-directional receiver performance



- Received sensitivity satisfies -20dBm with margin.

- Path penalty ~0.4dB@10^{-12}
- Overload >-2dBm

Summary

- Transmission test with B++ power budget (PIN@ONU) is examined.

- Transmitter performance
  - OLT output signal has enough Power and extinction ratio with un-cooled coaxial pump LD.
  - EDFA has good performance under 1W.

- Receiver performance
  - Satisfied the receiver sensitivity with margin.
  - PIN-PD within low cost bi-directional form factor was realized.