Northumbria Research Link

TABLE I . System parameters

| Parameter	Values
SOA	
Injection current	0.15 A
Length	0.25 mm
Active area	$2.4 \times 10^{-13} \text{m}^2$
Transparent carrier density	$1.4 \times 10^{24} \text{m}^{-3}$
Confinement factor	0.15
Differential gain	$2.78 \times 10^{-20} \text{m}^2$
Linewidth enhancement	5.0
Recombination coeff. A	$1.43 \times 10^8 \text{1/s}$
Recombination coeff. B	$1.0 \times 10^{-16} \text{m}^3/\text{s}$
Recombination coeff. C	$3.0 \times 10^{-41} \text{m}^6/\text{s}$
Initial carrier density	$3.0 \times 10^{24} \text{m}^{-3}$
Data and control signals	
Data bit rate per channel R_b	2.5 Gbit/s
FWHM width of clock, address and data signals	3 ps
Control and data wavelength	1550 nm
Data signal peak power	1 mW
Control signal peak power	90 mW for 4-8 ps and 185 mW for 120-160 ps switching window sizes
Rise and fall times	1 ps
$\eta_{amp2\text{-}in}$	0 dB
$\eta_{amp2\text{-}out}$	0 dB
Optical gain (overall) G_{tot}	25 dB
L_{of}	-8.97 dB
R_p	1 A/W
R_L	50 Ω
T_k	293 K
i_a^2	10 pA/Hz$^{1/2}$
Electrical bandwidth B_e	$0.7 R_b$
Optical bandwidth B_o	125 GHz
RMS_{jitter}	1 ps
NF	6 dB
Optical fibre length and loss	30 km and 6dB
DCF length and loss	5.4km and 3dB
Optical 3dB 2×2 couplers splitting ratio α	50:50
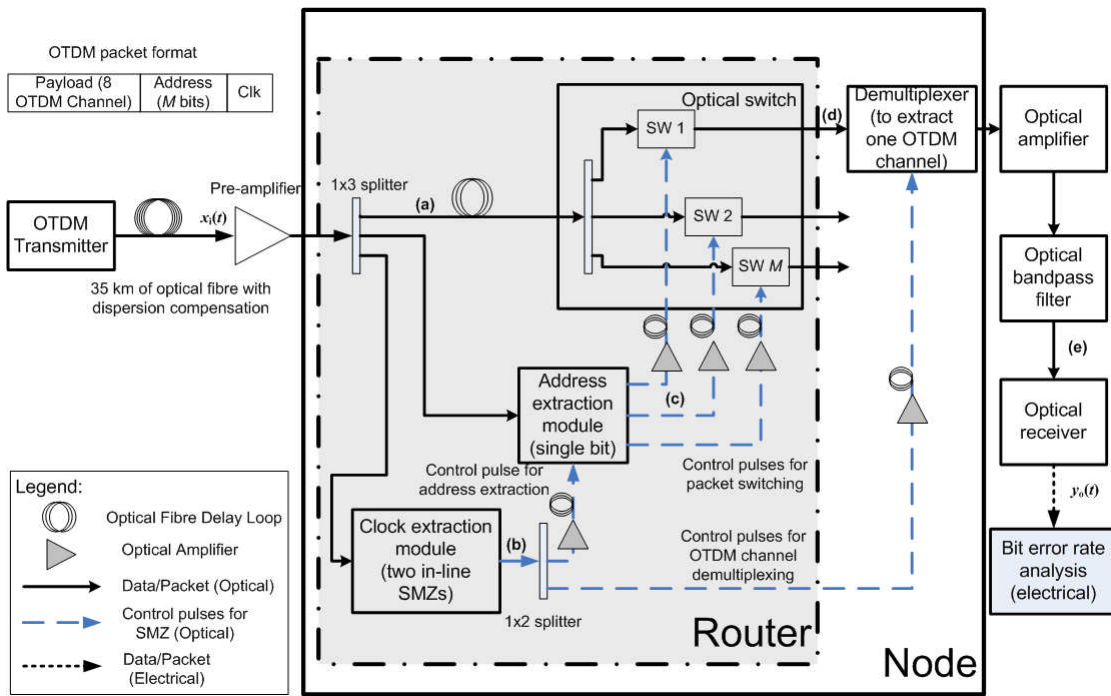
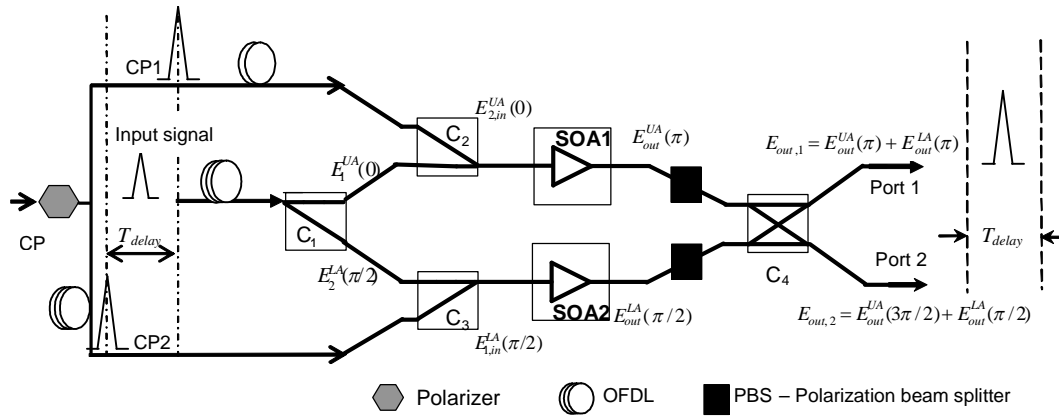Fig. 1 OTDM system block diagram with the proposed OTDM node
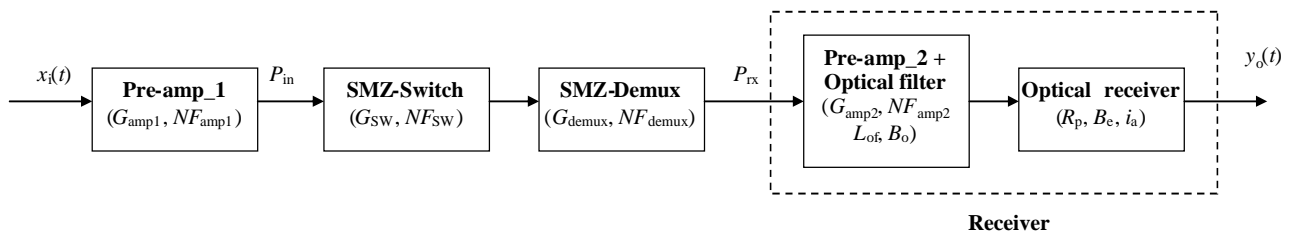
Fig. 2 SMZ switch block diagram
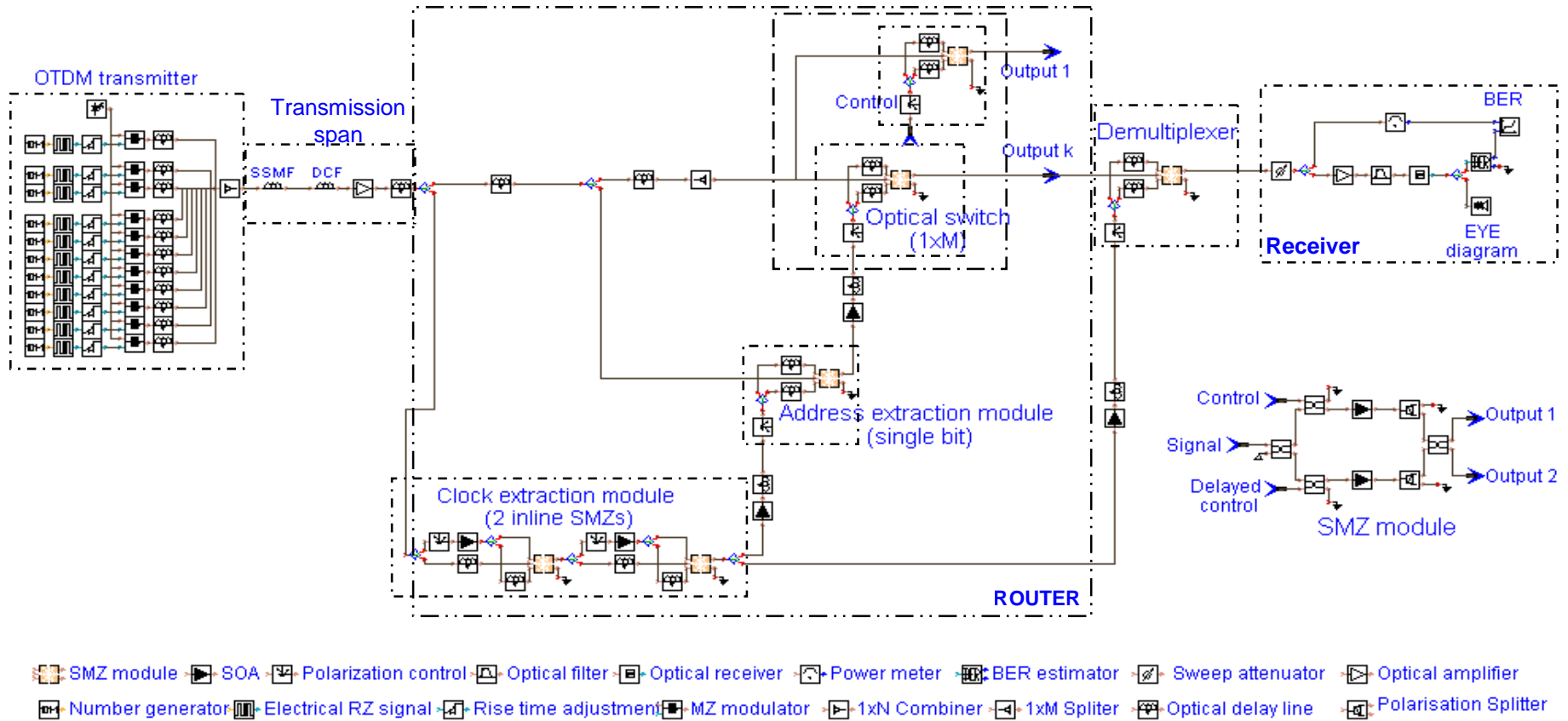

Fig. 3 Cascaded amplifying stages

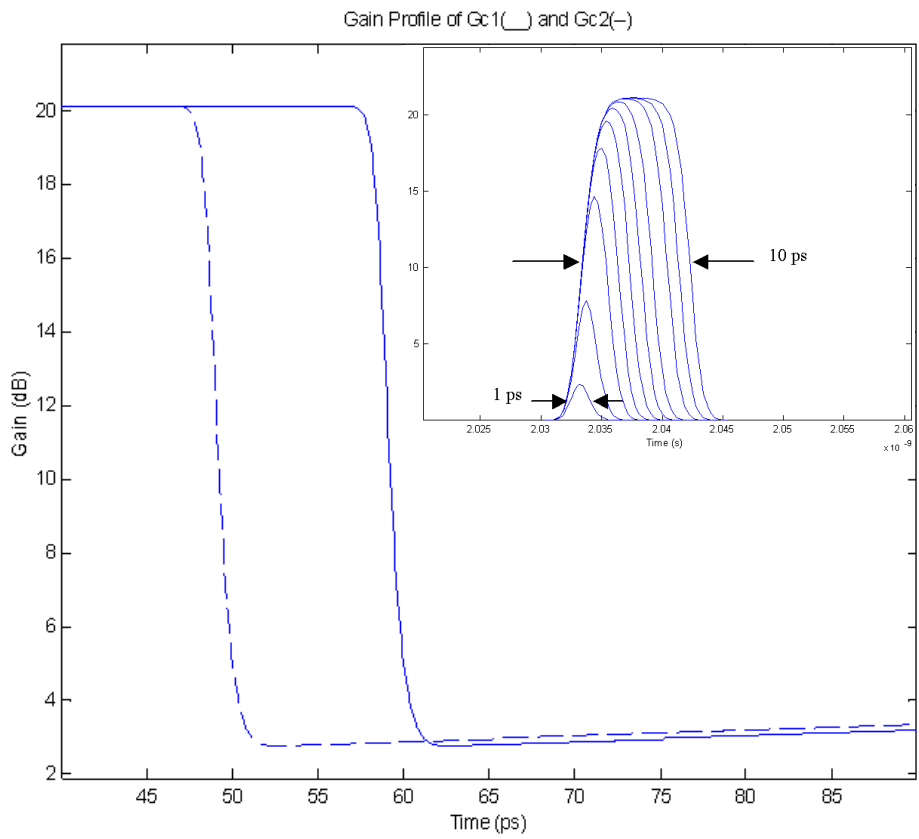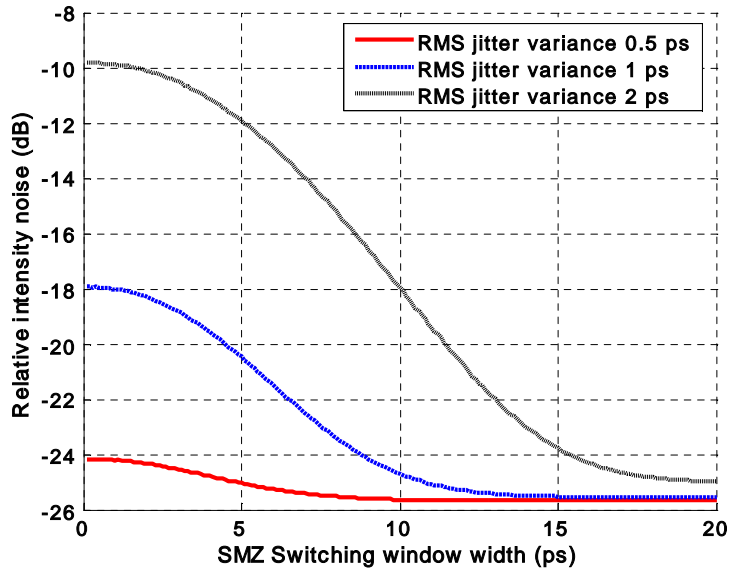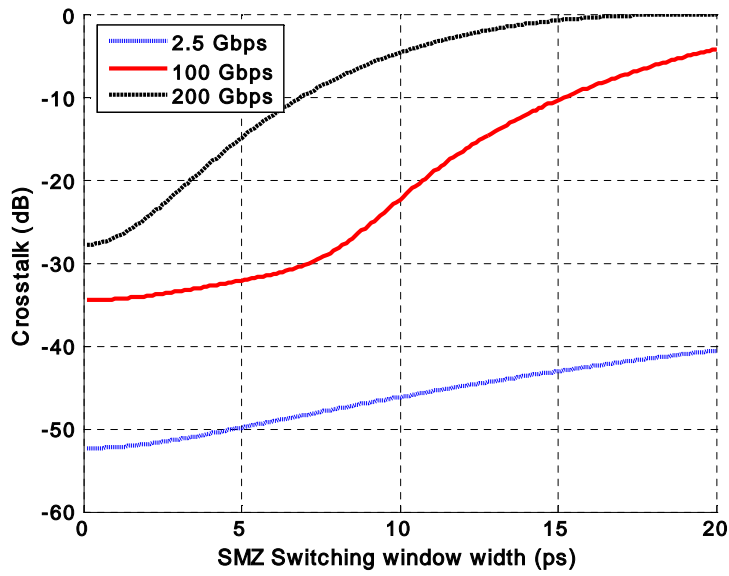Fig. 4 A schematic VPI® simulation model of 1×*M* OTDM system

Fig. 5 Gain profile of the data signals in SMZ, and inset is the resulting switching window with width from 1ps to 10 ps

(a)

(b)

Fig. 6 (a) Relative intensity noise against the switching window width for different values of *RMS*_{*jitter*} and (b) channel crosstalk against the switching window width for different total bit rates
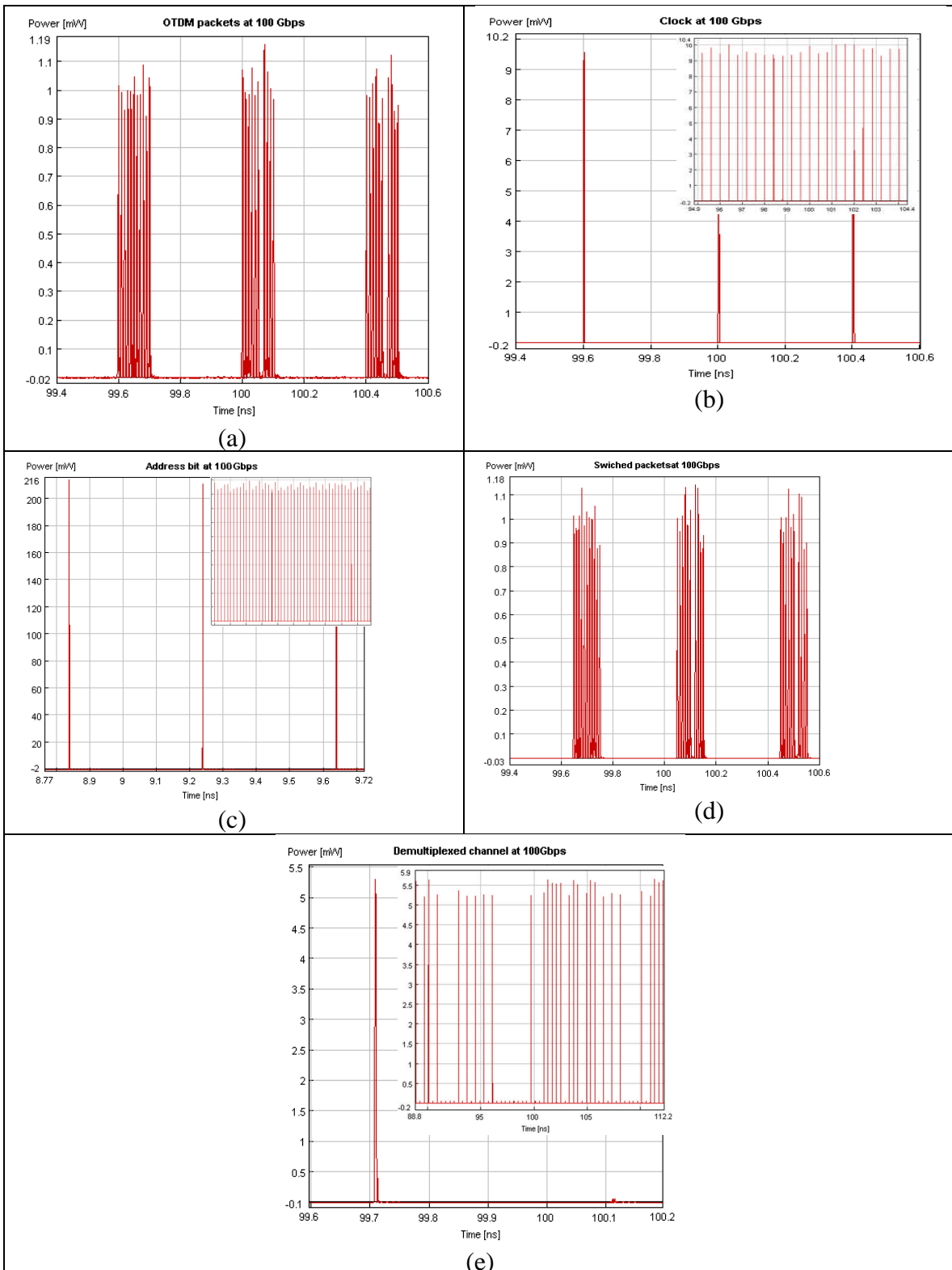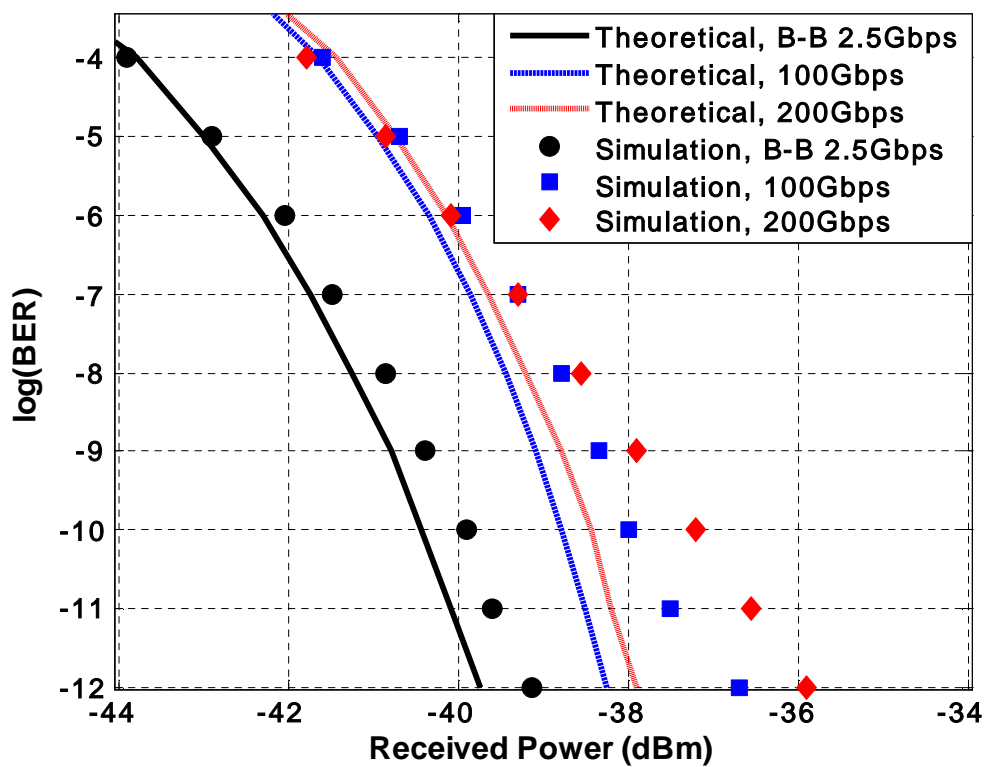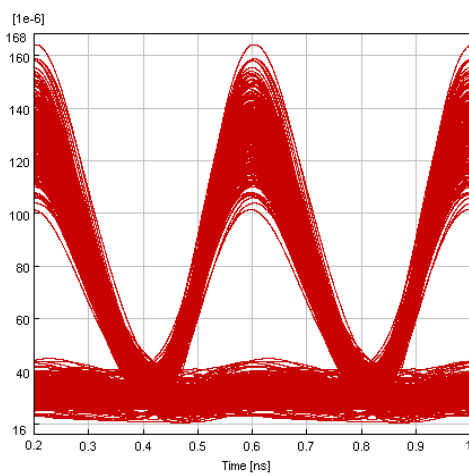
Fig. 7 Optical waveforms (a) input DM packet, (b) recovered clock pulses (inset clock bit stream), (c) address pulses (inset address bit stream), (d) switched OTDM packet and (e) demultiplexed channel (inset enlarged view)

(a)

(b)

Fig. 8 Numerical and simulated BER for 2.5, 100 and 200 Gbps, and (b) the eye diagram for demultiplexed data channel at 2.5 Gbps and BER of 10^{-9}