

(19) (KR)  
(12) (A)

(51) 。 Int. Cl. <sup>7</sup> H04B 10/04		(11) (43)	2003-0077089 2003 10 01
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(74)			
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(54)	-	-	

· , - IF  
O , 1 ; L  
LO - 2 ; IF  
3 , SOA , 가 ,  
가 - 가 ,  
·  
5  
· , - , - , WDM, MZM

2 RoF WDM

3 -

4

5

6a 6b SOA

7a 7b SOA RF -

gain modulation, XGM) (semiconductor optical amplifier, 'SOA' ) - (cross-g  
(all-optical) - (up-conversion) .

1 , (Radio-on-fiber, 'RoF' ) ,  
(base station, 'BS' ) (central office, 'CO' ) 가

avelength division multiplexing, RoF 'WDM' ) (w

2 . WDM - (Mach-Zenhdler Modulator, 'MZM' )

(R. A. Griffin *et al.* , Crosstalk Reduction in an Optical mm-W  
ave/DWDM Overlay for Radio-Over-Fibre Distribution, in *Tech. Dig. MWP99* , pp. 131 -134, 1999). MZM  
, MZM -  
가 .

, 가 (wavelength) (polarization) . ,  
5dB (insertion loss) . ,  
- 가 가 .

- , BS (elctrical local oscillator, 'LO' )  
(intermediate frequency, 'IF' ) (mixing)  
(optoelectronic mixng) , HEMT(high electron mobility transistor)  
HBT(heterobipolar transistor) 3 (three-terminal element)  
, BS LO (signal source) BS 가

, (baseband) IF LO  
- 가 (all-optical) .

ction) , 3 , (photo-detector, 'PD' ) (nonlinear photo-dete  
IF - (all-optical)

(M. Tsuchiya, *et al.* , Nonlinear Photodetection Scheme and Its System Applications to Fiber -  
Optic Millimeter-Wave Wireless Down-Links, *IEEE Trans on Microwave Theory and Techniques* , vol. 47, n  
o. 7, pp. 1342 -1350, 1999).  
(electrical oscillator)

LO (heterodyne) (ex. optical PLL, injection locking )

(all-optical approach)

(optoelectronic mixing)

(accessible)

(optical modulator)

(conversion efficiency)

LO LO CO BS BS LO

RoF - (up-conversion)

$$P_{\text{out}} = P_{\text{in}} \cdot G_{\text{SOA}} \cdot G_{\text{mod}} \cdot G_{\text{loss}}$$

LO , 1 ; IF LO  
2 ; IF LO  
LO - 3 .  
IF ; IF LO  
- , IF  
LO , LO

(cross-gain modulation) (optical modulator) (all-optical)

(optical gain) (optical losses)

XGM(cross gain modulation)

IF LO 가 SOA , SOA

( f IF ) SOA , LO ( f LO ) SOA

SOA IF LO SOA XGM , SOA

IF LO 가 IF SOA IF 가 LO

LO , SOA XGM IF 가 LO

5 (polarization-insensitive) SOA

SOA (Semiconductor Optical Amplifier)	LO (Local Oscillator)	MZM DSB-SC (double-sideband suppressed optical carrier)
DFB-LD (distributed feedback-laser diode)	1GHz	

z  
r coupler) , SOA(58)  
iable optical attenuator, VOA) SOA(58) 1GHz IF , IF 25GHz LO (peak) 가 (57, fiber  
(52, var

LO (54, Mach-Zenhder Modulator) V  
DSB-SC TLS(53, tunable laser source)  
, Mach-Zender (54) 12.5GHz 25GHz LO  
(12.5GHz) 가 EDFA(55, er-doped fiber  
amplifier) Er (fiber) (optical amplifier) . 가 LO  
(mixing) 가 (carrier) (PD)  
(electrical modulation power) +/- 1  
(optical carrier powe

r) 9dB

IF LO SOA(58) SOA(58) SOA(58) (cross-  
modulation) . SOA(58) 3GHz , SOA  
25GHz LO 5 PD(59, photo detector) , RF-SA(60  
, RF-spectrum analyzer) RF

6a 6b SOA(58) IF LO (optical spectrum) . IF  
LO 11nm 가 6a SOA ( ) LO +/- 1  
(sideband) 25GHz  
, Mach-Zenhder (54) 12.5GHz 가

6a 6b SOA(58) 16dB가 (optical gain)  
6b IF LO XGM , LO 가 SOA  
(-20 dB )

LO ( LO ) +/- 1 IF ( IF ) - (cross-modulation) , IF  
SOA +/- 1 XGM

7a 7b RF -

7b , - IF ( 7a)가 SOA(58) 25GHz LO 24GHz  
LSB (lower sideband) 26GHz USB(upper sideband) - 7a 7  
b , - LSB USB ( 7b) IF ( 7a) 10 dB 가  
가

gain) , SOA (gain) - (conversion  
gain)

, LO WDM IF( , baseband) RoF

가

LO 가 ,

, LO WDM - , LO

, RoF WDM , 가 가 ,  
WDM .  
, ,  
, LO CO BS , BS - LO  
(mixer)가 , BS .

(57)

1. (SOA) (all-optical) - (up-conversion) ,  
IF  
1 ,  
LO  
2 ,  
IF LO - (cross-gain modulation  
) 3 -  
.
2. 1 ,  
IF DFB-LD -
3. 1 ,  
LO DSB-SC -
4. 1 ,  
2 3 IF LO 가  
- - .
5. IF ,  
LO ,  
IF LO - ,  
IF , LO  
- .
6. 5 ,

IF

DFB-LD

7.

5

LO

DSB - SC

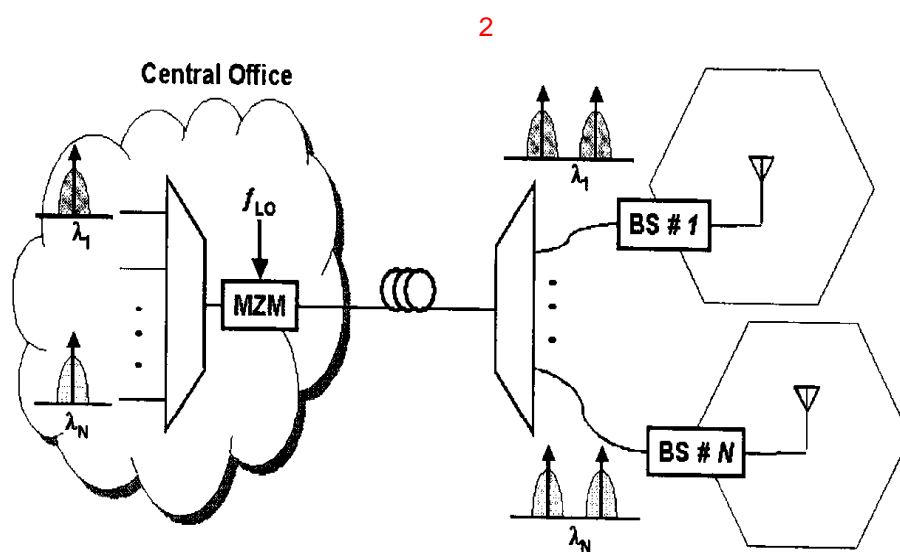
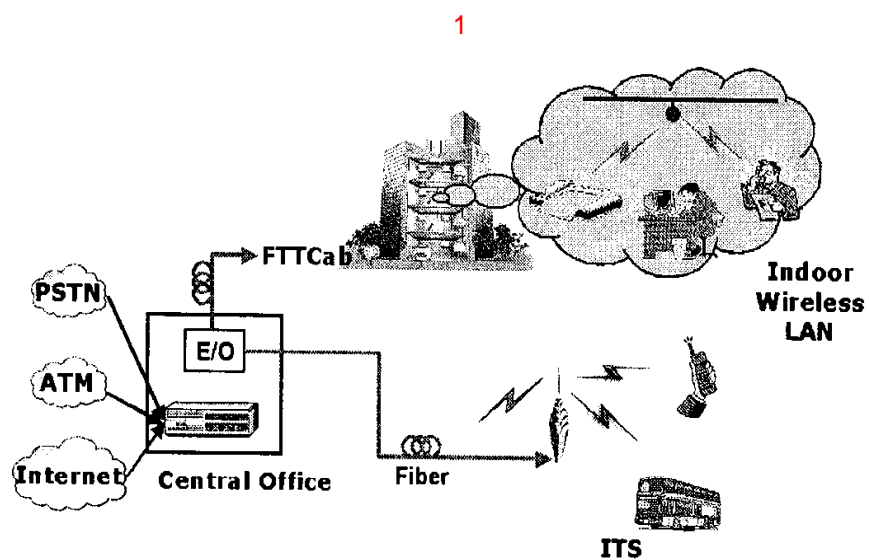
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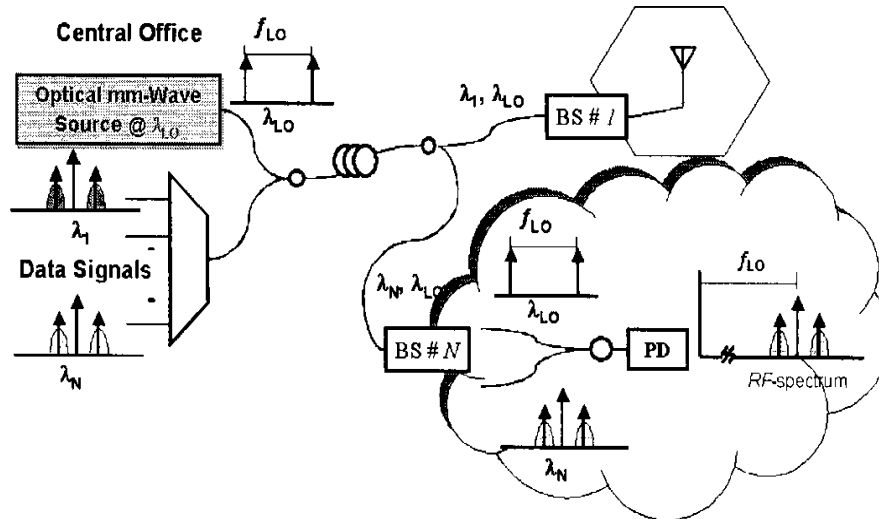
IF

LO

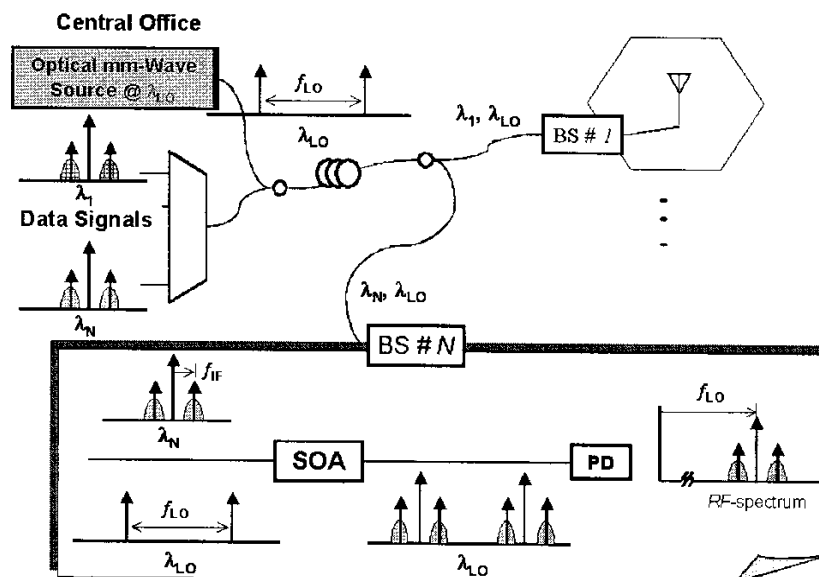
가



3



4



5

