

Table 3-6 Multiservice Technologies

	ATM, IP+ATM	IP/MPLS	MSPP	MSSP
	ATM UNI V3.1		NEBS Level 3	NEBS Level 3
	ANSI T1.816	RFC 2547-BGP/MPLS VPNs	GR-1089-CORE	GR-1089-CORE
	ANSI T1.408	RFC 2702	GR-63-CORE	GR-63-CORE
	ITU-T I.361, I.362, I.363	Requirements for Traffic Engineering over MPLS	European Telecommunication Standards Institute (ETSI) EN300-386	European Telecommunication Standards Institute (ETSI) EN300-386
	ITU-T I.555, I.356, I.432	RFC 3031-MPLS architecture		
Key Standards	ITU-T I.36x.1	RFC 3032-MPLS label stack encoding	SONET GR-253- CORE	SONET GR-253- CORE
	ITU-T H.222		SDH ITU-T G.707	SDH ITU-T G.707
	ITU-T Q.2100, Q.2110	RFC 3034-Use of label switching on Frame Relay networks specification	GR-1400-CORE	GR-1400-CORE
	ITU-T Q.2130, Q.2931	RFC 3035-MPLS using LDP and ATM VC switching	G.781, G.782, G.783, G.811, G.812, G.813, G.823, G.825, G.826, G.829	G.781, G.782, G.783, G.811, G.812, G.813
	ITU-T Q.931, Q.933	RFC 3036-LDP specification	IEEE 802.3, 802.1p, 802.1Q, 802.1D	OSMINE-certified TIRKS, NMA, transport (formerly TEMS)
	E1 G.703, G.704, G.804 RFC 1483, RFC 1695			
	SONET GR.253.CORE	RFC 3037-LDP applicability	OSMINE-certified TIRKS, NMA, transport (formerly TEMS)	SNMP V1, V2, TL1
	SDH ITU-T G.707	RFC 3038-VCID notification over ATM link for LDP	SNMP V1, V2, TL1	IEEE 802.3
	GFP ITU- G.7041			
Key Standards (Continued)				

	Optical Fiber ITU-T G.652/653			
	DWDM ITU-T G.692			
	MGX 8200/8800 PXM-1 shared memory switching architecture at 1.2 Gbps	7200/7300/7400/10000 - Shared memory with hardware assist		
	MGX 8850/8950 PXM-45 dual- processor, dual- core architecture, 45 Gbps, and 2.2 Gbps cell bus	6500/7600 crossbar to 720 Gbps XR 12000/12000/ CU11 IBM PowerPC with distributed crossbar multifabric, multilink CRS-1/ Dual PowerPC CPU complex per Route Processor. Line cards with Cisco Silicon Packet Processor ASIC with 188 32-bit RISC CPUs. 3-stage Benes architecture switch fabric	ONS 15454 Nonblocking XC and XCVT at VC4- Xc and VC12/3-Xc (future) XC10G XC-VXL-10G & 2.5G	ONS 15600 Core cross-connect CXC or SSXC 320 Gbps fabric Multishelf up to 5- terabit scalability
	RPM-PR 400 Kpps			
	RPM-XF 2.6 Mpps			
	Backplane Switching	Backplane Routing/Switching	Backplane Switching	Backplane Switching
	1.2 Gbps to 180 Gbps	7200/7300/7400/7500 up to 1 Mpps	240 Gbps total	40 Gbps per slot x 8 slots
Processor Architecture Technology	MGX 8200/8800 PXM-1 at 1.2	6500/7600 32 Gbps up to 720 Gbps and 15 to 30 Mpps	Data plane 160 Gbps SONET plane	STS/VC-4 switching fabric at 320+ Gbps
Backplane Switching Speed Range				

Interface Speed Support	Gbps	10000/51.2 Gbps	80 Gbps	6144 STS1 to 2048 OC-48 switching capacity
	MGX 8850/8950 PXM-45, 45 Gbps, and 2.2 Gbps cell bus	XR 12000/12000 30 Gbps to 1.2 Tbps CRS-1 single-shelf 640 Mbps/1.28 Tbps	10 DCC to 68 DCC 288 STS1 & 672 VT1.5 to 1152 STS1 & 672 VT1.5	
	MGX 8950	Multishelf up to 92 Tbps		
	XM-60 – 60 Gbps nonblocking cross-point switch fabric up to 4 XM- 60s for 240 Gbps or 180 Gbps redundant			
			T1/E1	
			T3/E3	
		T1/E1 (DS0/DS1)	OC-3/STM-1	
	T1/E1 (DS0/DS1)	T3/E3	OC-12/STM-4	
		OC-3/STM-1	OC-48/STM-16	Gigabit Ethernet
	T3/E3	OC-12/ STM-4	OC-192/STM-64	OC-3/STM-1
	OC-3/STM-1	OC-48/ STM-16	E100T-12/E100- 12-G	OC-12/STM-4
	OC-12/STM-4	OC192/STM-64		OC-48/STM-16
	OC-48/STM- 16	Fast/Gigabit/10 Gigabit Ethernet	E1000-2/E1000-2- G	OC192/STM-64
	OC-192/STM- 64	CRS-1	G1000-4/G1K-4	OC-768/STM-256
		OC-768/ STM-256	ML100T- 12/ML1000-2	
			CE100T-8	
			FC-MR-4	

Key Capacities	MGX 8250	7200/7300		
	Up to 192 T1/E1	NPE-G100 up to 1 Mpps supports interfaces from DS0 to OC-48/STM-16	140 x DS1 252 x E1	
	1,344 T1 channelized		192 x DS3	
		6500/7600	248 x E3	
	8 T3/E3		48 x OC-3/STM-1	3,072 STS-1 bidirectional cross-connects
	8 OC-3/STM-1	Up to 30 Mpps and 720 Gbps switching with 3 to 13 line card slots	16 x OC-12/STM-4	
	MGX 8850/8950	10000	12 x OC-48/STM-16	128 OC-3/STM-1
				128 OC-12/STM-4
	Up to 192 T1/E1	8 x 3.2 Gbps per line card slot or 16 x 1.6 Gbps per line card slot	6 x OC-192/STM-64	128 OC-48/STM-16
	1,344 T1 channelized	XR 12000/12000	144 x FastE	32 OC-192/STM-64
			48 x GE	
	192 T3/E3	4, 6, 10, and 16 line card slots at up to 40 Gbps each on 128XX series	32-64 x FC/FICON	64 UPSR/SNCP any combination of UPSR/SNCP, BLSR/MSSPRing, and 1+1 APS/MSP can be mixed with allowable maximums
	192 OC-3/STM-1		10 Gbps MR-TXP	
	48 OC-12/STM-4	CRS-1	Nonblocking VC-4 cross-connect capacity (line/line, trib/trib, line/trib)	
	12 OC-48/STM-16	Single-shelf with 8/16 40 Gbps line card slots		32 two-fiber BLSR/MS-SPRing
	MGX 8950	Multishelf, multifabric configuration up to 1,152 40 Gbps line card slots	Uni- and bi-directional cross-connect	64 1+1 APS/MSP uni- or bidirectional
	Up to 768 T3		HO cross-connect size 384 x 384 VC-4	PPMN
	768 OC-3/STM-1	1,152 OC-768/STM-256 POS		
	192 OC-12/STM-4	4,608 OC-192/STM-64 POS/DPT	Up to 5 rings supported per system - 4 SNCP and 1 MS SPRing or 5 SNCP	
	48 OC-48/STM-16	9,216 10 Gigabit Ethernet		

Bandwidth Range	12 OC-192/STM-64	18,432 OC-48/STM-16 POS/DPT		
	Narrowband to broadband to 10 Gbps ATM	Narrowband to broadband to 40 Gbps	Narrowband to broadband to 10 Gbps	Broadband switching to 40 Gbps
Service Provider Applications	Frame Relay			
	Voice adaptation transport		Digital cross-connect	
	Private line		Terminal mode	
	DSL aggregation	ATM/Frame Relay convergence	Linear add/drop multiplexer	
	MSC for WCDMA	Metro Ethernet	Two-fiber UPSR/SNCP/BLSR	
	High-density broadband ATM aggregation	Broadband aggregation	Four-fiber BLSR	Multiring (mixed UPSR/SNCP, BLSR/MS-SPRing, and 1+1 APS/MSP)
		ETTX aggregation	PPMN	
		IP/MPLS core (long haul and regional)	Two-fiber MS-SPRing	Linear ADM
	Multiservice bandwidth aggregation	Peering	Four-fiber MS-SPRing	Mesh
		Optical private line aggregation (OC-48 to DS0)	Multiring interconnection	Regenerator
	Distributed content storage		Extended SNCP	Star/hub
	IP VPN	ATM/Frame Relay transport services (over an IP/MPLS core)	Virtual rings	
	Broadband access		Hybrid SDH network topology	
	Wireless switched voice		Regenerator mode	
	Wireless trunking		Wavelength multiplexer	
	Class 4			

Provider and Customer Applicability		replacement			
				Storage area networks	
			L2 Ethernet switching to 10 Gigabit Ethernet	Exchange/central office colocation and interface to LH optical core networks	
			L2 MPLS (EoMPLS)		
	Voice networking	L3 MPLS		Metropolitan video transport, data, and voice optical backbone networks	
	Private line aggregation	Metro Ethernet			
		Private line aggregation		TLS platform	
	MPLS core and edge services	Ethernet subscriber aggregation		Campus and university backbone network	SONET/SDH ADM, BBDXC replacement, aggregation, and TDM switching
	L2 MPLS (EoMPLS)	MPLS core and edge services		Business transport network	
	L3 MPLS				Metro core and service POP switching
	WAN aggregation	WAN aggregation		Distributed bandwidth manager	
		Campus MAN			MSPP metro ring aggregation
	IP/VPN	High-speed WAN		Voice switch interface	
	Storage area networks	LAN to LAN		Colocation digital subscriber line access multiplexer (DSLAM) and voice aggregator and transport system	Circuit to packet transition
	Disaster recovery	VPN			
		Storage area networks			
	Internet access	Disaster recovery			
		Internet access		Cable TV (CATV) transport backbone network	
		Private line			
				Wireless cell site traffic aggregator	
				High-speed	

ATM/router link
extender