

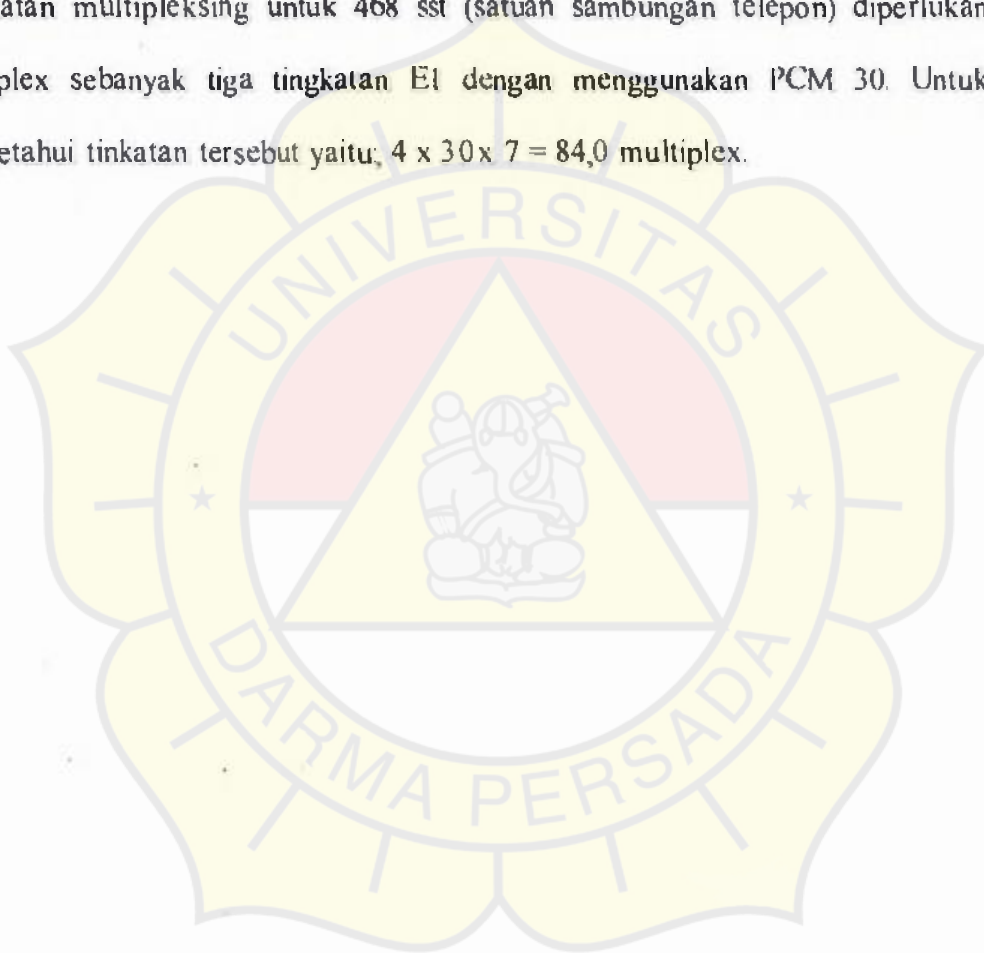
## BAB V

### KESIMPULAN

Berdasarkan data dan analisis perencanaan Jaringan Synchronous Digital Hierarchy Ring STO Mangga Besar dengan Apartemen Sedayu di PT. Telkom Kandatel Jakarta Utara, maka dapat ditarik kesimpulan bahwa :

1. Dalam melakukan suatu perencanaan penambahan jaringan maka diperlukan langkah-langkah seperti melakukan; Studi literatur berdasarkan adanya pembangunan gedung gedung baru, mengumpulkan data lapangan melakukan perhitungan perencanaan. Dari hasil langkah tersebut akan digunakan untuk menentukan jarak, spesifikasi alat serta optik dalam melakukan suatu perencanaan jaringan.
2. Berdasarkan pada data potensi proyek tahun 2004 di dapatkan suatu perencanaan jumlah telepon sebanyak 468 sst menggunakan teknologi PON/OAN dengan kapasitas telepon 480 sst tipe 4.
3. Untuk menentukan jumlah saluran yang di butuhkan telepon 468 sst dapat menggunakan rasio potensi 1:4 dimana dalam satu saluran transmisi diperlukan sebanyak 120 saluran akses. Dengan GOS 1 % didapat trafik sebesar 103,0 Erl dan trafik perpelanggan 220,8 mE. Sedangkan standart trafik trafik pelanggan di STO Jakarta Utara adalah minimal 225 mE pada saat ini. Maka dalam trafik perencanaan di Apartemen sedayu sesuai dengan yang di harapkan.

4. Berdasarkan data fiber optik dan interface optik kapasitas pentransmisian dapat dijangkau STM-I jarak terjauh maximum 24,61 Km sehingga dalam melakukan perencanaan apartemen sedayu pada ring STO Mangga Besar dengan jarak 1,8 Km masih dapat dijangkau oleh jarak maximum STM-I.
5. Tingkatan multipleksing untuk 468 sst (satuan sambungan telepon) diperlukan multiplex sebanyak tiga tingkatan E1 dengan menggunakan PCM 30. Untuk mengetahui tinkatan tersebut yaitu,  $4 \times 30 \times 7 = 84,0$  multiplex.



## DAFTAR PUSTAKA

1. ...., *Materi Siswa Pelatihan Customer Access Network Optical Fiber (CANOF) Tingkat Pre-Elementary Buku II Dasar Jarlokaf*, Jakarta : Telkom, 2001
2. ...., *Materi Siswa Pelatihan Customer Access Network Optical Fiber (CANOF) Tingkat Pre-Elementary Buku III Dasar Jarlokaf*, Jakarta: Telkom, 2001
3. Freeman R.L., *Telecommunication Transmission Handbook*, JOHN WILEY & SONS INC, 1981
4. Flood J.E.Flood, *Telecommunications Switching; Traffic and Network*, Prentice Hall, Inc, U.K, 1995
5. Proakis G. John, Manolakis G. Dimitris, *Digital Signal Processing*, Prentice – Hall, New Jersey, 1995
6. Mike Sexton and Andy Reid, *Transmission Network : SONET and The Synchronous Digital Hierarchy*, artech house, London 1992
7. ...., *Jaringan Lokal Akses Fiber, Pedoman, Perancangan, Kantor perusahaan PT. Telkom Kandatel Jakarta Utara*



**TELKOM**

**POTENSI PROYEK OAN SIEMENS**

KANDIDAT EL : JAKARTIA UTARA  
TAHUN : 2004

TRANSILANG JAN-1/1

NO	SDO	NAMA/USIAH	ALOKASI NOMOR	POTENSI ROTS			FAS JAW	INDOOR/OUTDOOR	KONSPIC	SENTRAL	INTEK FASE	RING	KAP ED	POTIS	SERVIS/POTENSI PERANGKAT OAN SIEMENS					KETERANGAN			
				SIAT ROTAL	ISI	KSB									REPAIR	REPAIR	REPAIR	REPAIR	REPAIR		REPAIR	REPAIR	
1	2	1 JKT 2 KAR	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
2	1	1 KARPIUN	64100961 s/d 64101336	366	210	136		INDOOR	SDH	EMER	V5.2	1	16	366	-	-	12	-	-	3	480		
3	1	1 HARJO MANGGA DIA 2 BDA 3 ARAJITBENTIBEDAYU	62307356 s/d 62307704 62306996 s/d 62307315 62310000 s/d 62310467	350 320 468	318 205 310	32 115 468	FIELD FIELD FIELD	INDOOR OUTDOOR OUTDOOR	SDH SDH SDH	ATAI ATAI ATAI	V5.2 V5.2 V5.2	1 1 1	33 15 85	350 320 468	-	-	12 12 6	-	-	2 2 2	444 444 480	Operasi Operasi Mandi dalam pemantauan	
4	1	1 BDU 2 PAKAR PAKIT MANGGA DIA 3 BDU 4 BDU 5 BDU 6 BDU 7 BDU 8 BDU 9 BDU 10 BDU 11 BDU	62309616 s/d 62309863 62309864 s/d 62309813 62309814 s/d 62309873 62309874 s/d 62309925 62310468 s/d 62310827 62310828 s/d 62311187 62311188 s/d 62311547	360 360 360 360 360 360 360 360 360 360 360	375 375 375 375 375 375 375 375 375 375 375	35 35 35 35 35 35 35 35 35 35 35	FIELD FIELD FIELD FIELD FIELD FIELD FIELD FIELD FIELD FIELD FIELD	INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR INDOOR	SDH SDH SDH SDH SDH SDH SDH SDH SDH SDH SDH	ATAI ATAI ATAI ATAI ATAI ATAI ATAI ATAI ATAI ATAI ATAI	V5.2 V5.2 V5.2 V5.2 V5.2 V5.2 V5.2 V5.2 V5.2 V5.2 V5.2	1 1 1 1 1 1 1 1 1 1 1	16 16 16 16 16 16 16 16 16 16 16	360 360 360 360 360 360 360 360 360 360 360	-	-	12 12 12 12 12 12 12 12 12 12 12	-	-	3 3 3 3 3 3 3 3 3 3 3	480 480 480 480 480 480 480 480 480 480 480	Operasi Operasi Operasi Operasi Operasi Operasi Operasi Operasi Operasi Operasi Operasi	
5	1	1 BDU	60937001 s/d 60937209	300	251	49	FIELD	INDOOR	SDH	EMER	V5.2	1	17	300	-	-	12	-	-	4	508	Operasi	
TOTAL POTENSI OAN SIEMENS				7.350	4.281	2.969						361	8.044	-	-	160	-	-	-	55	10.096		
TOTAL POTENSI PERANGKAT OAN SIEMENS																							

Jakarta, 25 FEBRUARI 2004  
DIBUAT OLEH  
SENSOR JARLOKAF

V. EDY DIATMOKO  
NIK 631823







### Spesifikasi serat optik

#### a. 1310 nm Optimized Fibre and Cable Characteristics

Table I.A  
Typical Fibre Construction

Number	Characteristic	Value
1	Fibre type	Single mode
2	Mode Field diameter (1310 nm)	$9.3 \pm 0.5 \mu\text{m}$
3	Mode field concentricity error	Not exceed 1 $\mu\text{m}$
4	Cladding diameter	$125 \pm 2 \mu\text{m}$
5	Cladding non circularity	<2%



Table II.A  
Typical Optical Fibre Cable Characteristics

Number	Characteristic	Value
1	Maximum Attenuation at 1310 nm	0.4 dB/Km
2	Maximum Attenuation at 1550 nm	0.3 dB/Km*
3	Maximum chromatic dispersion at 1310 nm	3.5 ps/ (nm.km)
4	Maximum chromatic dispersion at 1550 nm	20 ps/ (nm.km)
5	Min. Bending radius at full tensile strength	20 x cable OD
6	Maximum cut-off wavelength at 1310 nm ( $\lambda_{cc}$ )	1270 nm
7	Zero Dispersion Wavelength ( $\lambda_0$ )	1300- 1324 nm
8	Slope at Zero Dispersion Wavelength ( $S_0$ )	$\leq 0.093 \text{ ps/ (nm}^2 \text{ km)}$

Note(\*): For some applications, the maximum attenuation at 1550 nm region could be as small as 0.25 dB/km.

CATATAN :

Spesifikasi kabel optik.

Jumlah loose tube	Jumlah serat per loose tube	Diameter luar/dalam Loose tube (mm)	Diameter luar kabel (mm)	Jumlah serat
6	2	2.2 x 1.4	13	4-12
6	4	2.2 x 1.4	13	4-24
6	6	2.5 x 1.5	13.5	6-36
6	12	3.5 x 2.5	16	12-72
8	4	2.2 x 1.4	15	24
8	6	2.5 x 1.5	16	24-48
8	12	3.5 x 2.5	17.5	24-96

Jumlah fiber pada 6 Loose tube

Fiber count	Loose tubes Number					
	1 (Biru)	2 (Orange)	3 (Hijau)	4 (Kuning)	5 (Abu-abu)	6 (Putih)
4	2	Filter	Quad/Fiber	2	Filter	Quad/Fiber
4	4	Filter	Filter	Filter	Filter	Quad/Fiber
6	2	2	Quad/Fiber	2	Filter	Quad/Fiber
6	6	Filter	Quad/Fiber	Filter	Filter	Quad/Fiber
8	2	2	Quad/Fiber	2	2	Quad/Fiber
8	4	Filter	Quad/Fiber	4	Filter	Quad/Fiber
10	2	2	2	2	2	Quad/Fiber
12	2	F	2	2	2	2
12	4	4	Quad/Fiber	Filter	4	Quad/Fiber
12	6	Filter	Quad/Fiber	6	Filter	Quad/Fiber
16	4	4	Quad/Fiber	4	4	Quad/Fiber
18	6	6	Quad/Fiber	Filter	6	Quad/Fiber
24	4	4	4	4	4	4
24	6	6	Quad/Fiber	6	6	Quad/Fiber
24	12	Filter	Quad/Fiber	12	Filter	Quad/Fiber
36	6	6	6	6	6	6
36	12	12	Quad/Fiber	Filter	12	Quad/Fiber
48	12	12	Quad/Fiber	12	12	Quad/Fiber
60	12	12	12	12	12	Quad/Fiber
72	12	12	12	12	12	12

CATATAN :



Spesifikasi kabel optik.

Jumlah loose tube	Jumlah serat per loose tube	Diameter luar/dalam Loose tube (mm)	Diameter luar kabel (mm)	Jumlah serat
6	2	2.2x1.4	13	4-12
6	4	2.2x1.4	13	4-24
6	6	2.5x1.5	13.5	6-36
6	12	3.5x2.5	16	12-72
8	4	2.2x1.4	15	24
8	6	2.5x1.5	16	24-48
8	12	3.5x2.5	17.5	24-96



Jumlah fiber pada 8 loose tube

Fiber Count	Loose tubes Number							
	1 (Biru)	2 (Oranye)	3 (Hijau)	4 (Coklat)	5 (Abu-abu)	6 (Putih)	7 (Merah)	8 (Hitam)
24	4	4	4	Quad/Filler	4	4	4	Quad/Filler
24	6	Filler	6	Quad/Filler	6	Filler	6	Quad/Filler
24	12	Filler	Filler	Quad/Filler	12	Filler	Filler	Quad/Filler
36	6	6	6	Quad/Filler	6	6	6	Quad/Filler
36	12	12	Filler	Quad/Filler	12	Filler	12	Quad/Filler
48	6	6	6	6	6	6	6	6
48	12	Filler	12	Quad/Filler	12	Filler	12	Quad/Filler
60	12	12	Filler	Quad/Filler	12	12	12	Quad/Filler
72	12	12	12	Quad/Filler	12	12	12	Quad/Filler
84	12	12	12	12	12	12	12	Quad/Filler
96	12	12	12	12	12	12	12	12



CATATAN :



# Optical performances

	unit	values			
DIGITAL SIGNAL Nominal bit rate	kbit/s	STM-1 (According to G.707 and G.958): 155 520			
<i>Application code</i>		S-1.1	L-1.1	L-1.2	L-1.3
<i>Operating wavelength range</i>	nm	1280/ 1335	1280/ 1335	1530/ 1570	1530/ 1570
<b>TRANSMITTER AT REFERENCE POINT S</b>					
<i>Source type</i>		FP-LD	FP-LD	DFB-LD	DFB-LD
<i>Spectral characteristics</i>					
- Maximum RMS width (σ)	nm	7.7	4	-	-
- Maximum -20dB width	nm	-	-	1	1
- Minimum side mode suppression ratio	dB	-	-	30	30
<i>Mean launched power</i>					
- Maximum	dBm	-8	0	0	0
- Minimum	dBm	-15	-5	-5	-5
- Typical	dBm	-12	-2.7	-2.7	-2.7
<i>Minimum extinction ratio</i>	dB	8.2	10	10	10
<b>RECEIVER AT REFERENCE POINT R</b>					
<i>Minimum sensitivity</i>	dBm	-34	-34	-34	-34
<i>Minimum overload</i>	dBm	-4	-4	-4	-4
<i>Maximum optical path penalty</i>	dB	1	1	1	1
<i>Maximum reflectance of receiver, measured at R</i>	dB	NA	NA	-25	-25
<b>OPTICAL PATH BETWEEN S AND R</b>					
<i>Minimum optical return loss of cable plant at S</i>	dB	NA	NA	20	20
<i>Maximum discrete reflectance between S and R</i>	dB	NA	NA	-27	-27
<i>Maximum dispersion</i>	ps/nm	100	185	1900	NA
<i>Attenuation range</i>	dB	0-12	4-28	4-28	4-28

**NOTES:**

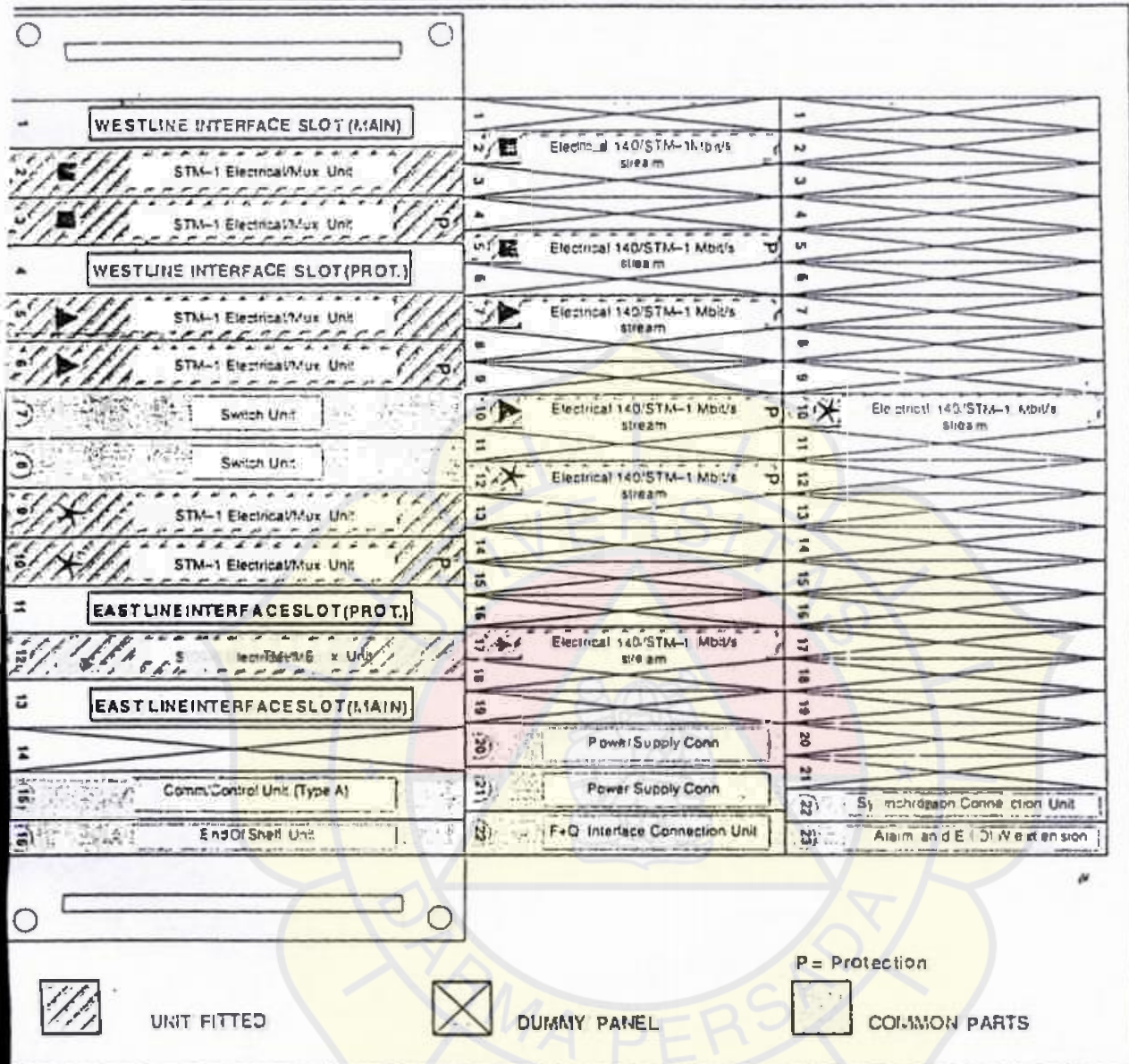
NA = Not applicable

N	B																				N											
	0.01% 0.02% 0.03% 0.05% 0.1% 0.2% 0.3% 0.4% 0.5% 0.6% 0.7% 0.8% 0.9% 1.0% 1.2% 1.5% 2% 3% 5% 7.5%																															
	0.01%	0.02%	0.03%	0.05%	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.8%	0.9%	1.0%	1.2%	1.5%	2%	3%	5%	7.5%												
100	50.5	70.0	71.0	71.2	75.2	77.5	78.0	80.0	80.3	81.7	82.4	83.0	83.5	84.1	85.0	86.2	88.0	90.8	95.2	97	104.1	112.3	120.6	139.7	164.3	193.0	232.0	280.0	340.0	410.0	500.0	100
101	70.9	72.6	73.6	75.0	77.0	79.3	80.7	81.8	82.7	83.5	84.2	84.8	85.4	85.9	86.3	86.8	89.9	92.8	97.3	101.3	106.3	114.6	123.1	142.6	167.6	207.0	256.0	316.0	386.0	466.0	556.0	101
102	72.6	74.3	75.3	76.7	78.8	81.1	82.5	83.5	84.6	85.4	86.1	86.7	87.3	87.8	88.5	89.1	91.7	94.8	97.3	101.3	106.3	114.6	123.1	142.6	167.6	207.0	256.0	316.0	386.0	466.0	556.0	102
103	74.3	76.0	77.1	78.5	80.5	82.8	84.2	85.2	86.3	87.2	88.0	88.6	89.2	89.7	90.7	91.5	93.6	96.7	101.4	107.4	113.7	122.5	131.6	151.4	176.4	216.0	266.0	326.0	396.0	476.0	566.0	103
104	76.0	77.7	78.8	80.2	82.3	84.6	86.0	87.2	88.3	89.1	89.8	90.5	91.1	91.6	92.5	93.5	95.8	97.7	100.7	105.5	111.9	120.7	129.9	149.7	174.7	214.4	264.4	324.4	394.4	474.4	564.4	104
105	77.7	79.4	80.5	81.9	84.1	86.4	87.8	89.0	90.1	90.9	91.5	92.1	92.6	93.4	94.5	95.8	98.2	100.7	105.5	109.5	116.1	124.9	134.2	154.0	179.0	218.8	268.8	328.8	398.8	478.8	568.8	105
106	79.4	81.1	82.2	83.7	85.8	88.1	89.5	90.7	91.8	92.6	93.2	93.8	94.3	94.9	95.8	96.9	99.4	102.7	107.5	111.5	118.1	126.9	136.2	156.0	181.0	220.8	270.8	330.8	400.8	480.8	570.8	106
107	81.1	82.9	84.0	85.5	87.6	90.1	91.5	92.8	93.9	94.7	95.3	95.9	96.5	97.2	98.1	99.2	101.7	105.7	110.5	114.5	121.1	129.9	139.2	159.0	184.0	223.8	273.8	333.8	403.8	483.8	573.8	107
108	82.9	84.6	85.7	87.2	89.3	91.9	93.3	94.6	95.7	96.5	97.2	97.8	98.4	99.1	100.0	101.1	103.6	108.5	113.3	117.3	123.9	132.7	142.0	161.8	186.8	226.6	276.6	336.6	406.6	486.6	576.6	108
109	84.6	86.3	87.4	88.9	91.0	93.7	95.1	96.4	97.5	98.3	99.0	99.6	100.2	100.9	101.8	102.9	105.4	110.3	115.1	119.1	125.7	134.5	143.8	163.6	188.6	228.4	278.4	338.4	408.4	488.4	578.4	109
110	86.3	88.0	89.1	90.7	92.8	95.5	96.9	98.2	99.3	100.1	100.8	101.4	102.0	102.7	103.6	104.7	107.2	112.1	116.9	120.9	127.5	136.3	145.6	165.4	190.4	230.2	280.2	340.2	410.2	490.2	580.2	110
111	88.0	89.7	90.8	92.4	94.5	97.2	98.6	100.0	101.1	101.9	102.6	103.2	103.8	104.5	105.4	106.5	109.0	113.9	118.7	122.7	129.3	138.1	147.4	167.2	192.2	232.0	282.0	342.0	412.0	492.0	582.0	111
112	89.7	91.4	92.5	94.1	96.2	98.9	100.3	101.7	102.8	103.6	104.3	104.9	105.5	106.2	107.1	108.2	110.7	115.6	120.4	124.4	131.0	139.8	149.1	168.9	193.9	233.7	283.7	343.7	413.7	493.7	583.7	112
113	91.4	93.1	94.2	95.8	97.9	100.6	102.0	103.4	104.5	105.3	106.0	106.6	107.2	107.9	108.8	109.9	112.4	117.3	122.1	126.1	132.7	141.5	150.8	170.6	195.6	235.4	285.4	345.4	415.4	495.4	585.4	113
114	93.1	94.8	95.9	97.5	99.6	102.3	103.7	105.1	106.2	107.0	107.7	108.3	108.9	109.6	110.5	111.6	114.1	119.0	123.8	127.8	134.4	143.2	152.5	172.3	197.3	237.1	287.1	347.1	417.1	497.1	587.1	114
115	94.8	96.5	97.6	99.2	101.3	104.0	105.4	106.8	107.9	108.7	109.4	110.0	110.6	111.3	112.2	113.3	115.8	120.7	125.5	129.5	136.1	144.9	154.2	174.0	199.0	238.8	288.8	348.8	418.8	498.8	588.8	115
116	96.5	98.2	99.3	100.9	103.0	105.7	107.1	108.5	109.6	110.4	111.1	111.7	112.3	113.0	113.9	115.0	117.5	122.4	127.2	131.2	137.8	146.6	155.9	175.7	200.7	240.5	290.5	350.5	420.5	500.5	590.5	116
117	98.2	100.0	101.1	102.7	104.8	107.5	108.9	110.3	111.4	112.2	112.9	113.5	114.1	114.8	115.7	116.8	119.3	124.2	129.0	133.0	139.6	148.4	157.7	177.5	202.5	242.3	292.3	352.3	422.3	502.3	592.3	117
118	100.0	101.7	102.8	104.4	106.5	109.2	110.6	112.0	113.1	113.9	114.6	115.2	115.8	116.5	117.4	118.5	121.0	125.9	130.7	134.7	141.3	150.1	159.4	179.2	204.2	244.0	294.0	354.0	424.0	504.0	594.0	118
119	101.7	103.4	104.5	106.1	108.2	110.9	112.3	113.7	114.8	115.6	116.3	116.9	117.5	118.2	119.1	120.2	122.7	127.6	132.4	136.4	143.0	151.8	161.1	180.9	205.9	245.7	295.7	355.7	425.7	505.7	595.7	119
120	103.4	105.1	106.2	107.8	110.0	112.7	114.1	115.5	116.6	117.4	118.1	118.7	119.3	120.0	120.9	121.9	124.4	129.3	134.1	138.1	144.7	153.5	162.8	182.6	207.6	247.4	297.4	357.4	427.4	507.4	597.4	120
121	105.1	106.8	107.9	109.5	111.7	114.4	115.8	117.2	118.3	119.1	119.8	120.4	121.0	121.7	122.6	123.7	126.2	131.1	135.9	139.9	146.5	155.3	164.6	184.4	209.4	249.2	299.2	359.2	429.2	509.2	599.2	121
122	106.8	108.5	109.6	111.2	113.4	116.1	117.5	118.9	120.0	120.8	121.5	122.1	122.7	123.4	124.3	125.4	127.9	132.8	137.6	141.6	148.2	157.0	166.3	186.1	211.1	250.9	300.9	360.9	430.9	510.9	600.9	122
123	108.5	110.2	111.3	112.9	115.1	117.8	119.2	120.3	121.1	121.9	122.6	123.2	123.8	124.5	125.4	126.5	129.0	133.9	138.7	142.7	149.3	158.1	167.4	187.2	212.2	252.0	302.0	362.0	432.0	512.0	602.0	123
124	110.2	111.9	113.0	114.6	116.8	119.5	120.9	122.0	122.8	123.6	124.3	124.9	125.5	126.2	127.1	128.2	130.7	135.6	140.4	144.4	151.0	159.8	169.1	188.9	213.9	253.7	303.7	363.7	433.7	513.7	603.7	124
125	111.9	113.6	114.7	116.3	118.5	121.2	122.6	123.7	124.5	125.3	126.0	126.6	127.2	127.9	128.8	129.9	132.4	137.3	142.1	146.1	152.7	161.5	170.8	190.6	215.6	255.4	305.4	365.4	435.4	515.4	605.4	125
126	113.6	115.3	116.4	118.0	120.2	122.9	124.3	125.4	126.2	127.0	127.7	128.3	128.9	129.6	130.5	131.6	134.1	139.0	143.8	147.8	154.4	163.2	172.5	192.3	217.3	257.1	307.1	367.1	437.1	517.1	607.1	126
127	115.3	117.0	118.1	119.7	121.9	124.6	126.0	127.1	127.9	128.7	129.4	130.0	130.6	131.3	132.2	133.3	135.8	140.7	145.5	149.5	156.1	164.9	174.2	194.0	219.0	258.8	308.8	368.8	438.8	518.8	608.8	127
128	117.0	118.7	119.8	121.4	123.6	126.3	127.7	128.8	129.6	130.4	131.1	131.7	132.3	133.0	133.9	135.0	137.5	142.4	147.2	151.2	157.8	166.6	175.9	195.7	220.7	260.5	310.5	370.5	440.5	520.5	610.5	128
129	118.7	120.4	121.5	123.1	125.3	128.0	129.4	130.5	131.3	132.1	132.8	133.4	134.0	134.7	135.6	136.7	139.2	144.1	148.9	152.9	159.5	168.3	177.6	197.4	222.4	262.2	312.2	372.2	442.2	522.2	612.2	129
130	120.4	122.1	123.2	124.8	127.0	130.7	132.1	133.2	134.0	134.8	135.5	136.1	136.7	137.4	138.3	139.4	141.9	146.8	151.6	155.6	162.2	171.0	180.3	200.1	225.1	264.9	314.9	374.9	444.9	524.9	614.9	130
131	122.1	123.8	124.9	126.5	128.7	132.4	133.8	134.9	135.7	136.5	137.2	137.8	138.4	139.1	140.0	141.1	143.6	148.5	153.3	157.3	163.9	172.7	182.0	201.8	226.8	266.6	316.6	376.6	446.6	526.6	616.6	131
132	123.8	125.5	126.6	128.2	130.4	134.1	135.5	136.6	137.4	138.2	138.9	139.5	140.1	140.8	141.7	142.8	145.3	150.2	155.0	159.0	165.6	174.4	183.7	203.5	228.5	268.3	318.3	378.3	448.3	528.3	618.3	132
133	125.5	127.2	128.3	129.9	132.1	135.8	137.2	138.3	139.1	139.9	140.6	141.2	141.8	142.5	143.4	144.5	147.0	151.9	156.7	160.7	167.3	176.1	185.4	205.2	230.2	270.0	320.0	380.0	450.0	530.0	620.0	133
134	127.2	128.9	130.0	131.6	133.8	137.5	138.9	139.9	140.7	141.5	142.2	142.8	143.4	144.1	145.0	146.1	148.6	153.5	158.3	162.3	168.9	177.7	187.0	206.8	231.8	271.6	321.6	381.6	451.6	531.6	621.6	134
135	128.9	130.6	131.7	133.3	135.5	139.2	140.6	141.6	142.4	143.2	143.9	144.5	145.1	145.8	146.7	148.2	153.1	157.9	161.9	165.9	172.5	181.3	190.6	210.4	235.4	275.2	325.2	385.2	455.2	535.2	625.2	135
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### Seven STM-1 Electrical/Mux Units

Three Couples With 1 + 1 Line Protection + One Unit Without Protection



Each unit marked with a symbol (e.g. ●) is served via fixed electrical connection by the connection units bearing that symbol.

Fig. 1.3-9. Seven STM-1 Electrical/Mux Units with 1 + 1 line protection

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