

BAB V

KESIMPULAN

Berdasarkan data hasil perencanaan dan perhitungan *link* pada sistem transmisi data *wireless IP point to multipoint* antara *Central Site* (Menara 2 BII) dengan *Remote Site* (Pasar Raya Blok M) didapatkan kesimpulan bahwa:

1. Dalam menentukan *Central Site* dibutuhkan gedung atau *tower* yang sangat tinggi agar dapat menjangkau *Remote Site* dalam keadaan *Line Of Sight* (LOS).
2. Pembuatan profil jalur untuk wilayah Jakarta yang mempunyai banyak gedung bertingkat diperlukan cara manual dalam memperkirakan tinggi halangan pada jalur LOS.
3. Dari hasil perhitungan *link* didapatkan bahwa nilai EIRP untuk *uplink* sebesar 35,56 dBm dan untuk *downlink* sebesar 35,3 dBm serta nilai *fade margin* untuk *uplink* sebesar 31,76 dBm, untuk *downlink* sebesar 31,48 dBm. hal ini berarti sistem sesuai dengan aturan FCC (*Federal Communications Commission*) yang mengatur besarnya EIRP maksimum 36 dBm dan besarnya *fade margin* minimum 20 dBm.
4. Tingkat kehandalan sistem yang dinyatakan dalam *time availability* sebesar 99,99 % karena sistem sesuai dengan aturan FCC.

DAFTAR PUSTAKA

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2. Freeman Roger L, " *Telecommunication Transmission Handbok* ", third edition, John wiley & Son, 1996
3. Lars Poulsen, " *Fixed Wireless Internet Access* ", UC Wireless, <http://www.janus.utilicom.com/UCWireless/>
4." *Point To Multipoint Digital Microwave SR-500* ", Telecom, Canada, 1998.
5.Peta Jakarta Skala 120000, PT Pembina Peraga, 2001
6." *Systems Planing Product Specifications Services* ", Andrew, United States of America, 1991.
7." *Wireless Point To Multipoint* ", <http://www.karlnet.com>.



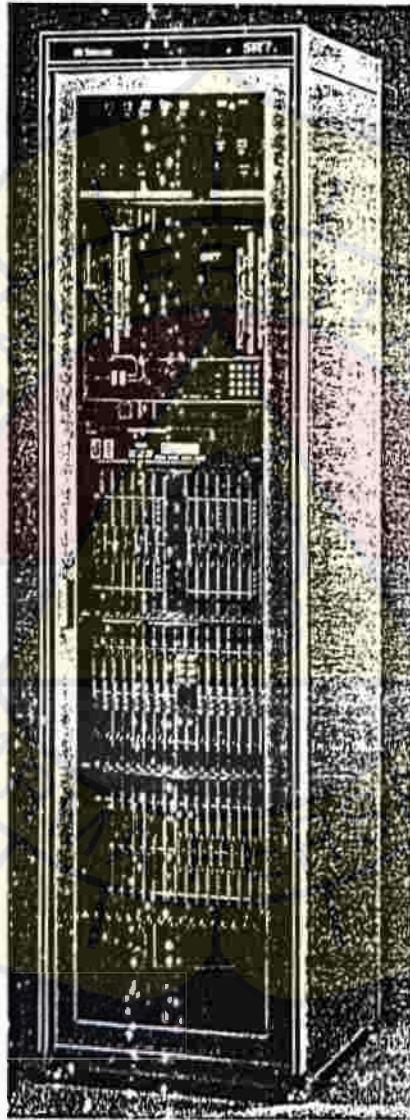
LAMPIRAN

SR Telecom

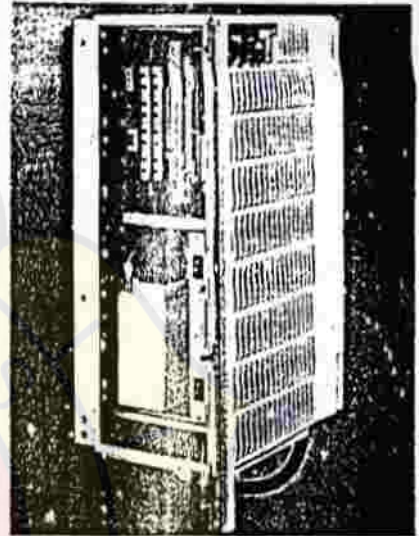
SR500s

PMP-TDMA Digital Subscriber Radio System distributing telecommunication services to over 1000 subscribers located anywhere in a radius of up to 720 km

- Wide range of frequency bands: 1.3 to 2.7 GHz and 10.5 GHz
- 60,64-kbps PCM trunks for use in either demand access or dedicated mode
- Single pair of radio frequencies per network node
- 511 remote stations, including the SLIM and Micro series
- Variety of telephone and data interfaces for wireline applications: 2-wire, 4-wire, payphone, telex, synchronous, asynchronous, G.703
- Network-extension support via existing point-to-point networks
- Intracall and orderwire options
- Integrated network management system, including continuous quality testing
- Weatherproof outdoor equipment operating over the full range of climatic conditions
- Conforms to the ETSI prETS 300 636 standard



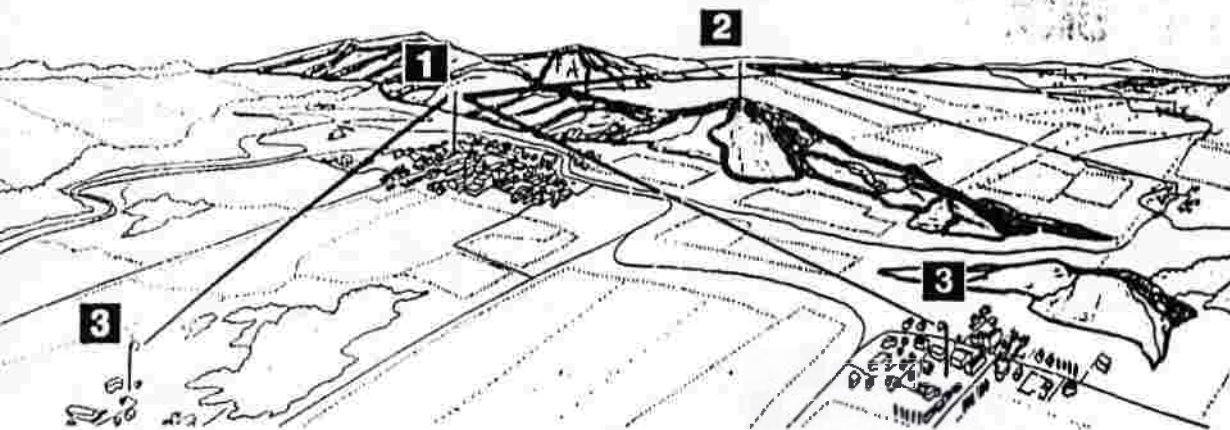
SR500-s protected central station installed in a standard 19"-wide rack enclosure and equipped with UDI and line/data shelves



SLIM 10 outstation equipped with nine 2-wire VF lines and one orderwire line



Antenna Integrated Module (AIM) of the 10.5GHz transceiver option



CENTRAL STATION



Capacity
Analogue Lines 1024 payphone or 2-wire VF; 512 ISDN;
 512 telex; or 256 4-wire E&M
Data Lines 256 asynchronous, synchronous, or G.703 (64 kbps)
Digital Lines* 960 (E1) or 768 (T1)
Power
Input Voltage -24 or -48 VDC; or 120/240 VAC at 50/60 Hz (option)
Typical Requirement¹ 30 W (analogue lines) or 60 W (digital lines)

* The Universal Digital Interface (UDI) supports both E1 (2048 kbps) and T1 (1544 kbps) primary rate carriers in compliance with ITU-T recommendations: G.703, C.704, G.706, G.732, G.821, and G.823. Signalling is adaptable to various digital exchanges.

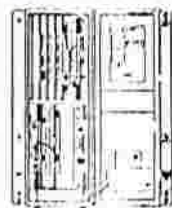
REPEATERS



Rack-Mounted Repeater (RMF)

Capacity
Analogue Lines 256 payphone or 2-wire VF; 128 ISDN;
 128 4-wire E&M; or 64 telex
Data Lines 128 asynchronous, synchronous, or G.703 (64 kbps)
Power
Input Voltage -24 or -48 VDC; or 120/240 VAC at 50/60 Hz (option)
Typical Requirement¹ 100 W

SLIM Drop Repeater



Capacity²

SLIM Drop
 SLIM Through

2-Wire	Payphone	4-Wire E&M	ISDN	Data	Telex
10	9	4	4	4	2
1 ²	-	-	-	-	-

Power
Input Voltage +13.6 VDC; -18 to -72 VDC; inverted ground option; or 120/240 VAC at 50/60 Hz (using power pack)
Typical Requirement¹ 60 W
Reserve 35 to 140 Ah (using power pack)

3

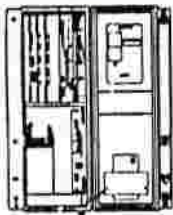


Rack-Mounted Outstation (RMO)

OUTSTATIONS

Capacity
Analogue Lines 256 payphone or 2-wire VF; 128 ISDN;
 128 4-wire E&M; or 64 telex
Data Lines 128 asynchronous, synchronous, or G.703 (64 kbps)
Power
Input Voltage -24 or -48 VDC; or
 120/240 VAC at 50/60 Hz (option)
Typical Requirement¹ 60 W

SLIM 10



Capacity²

SLIM 10

SLIM 34

2-Wire	Payphone	4-Wire E&M	ISDN	Data	Telex
10	9	4	4	4	2
34	33	16	16	8*	8

Power

Input Voltage

+13.6 VDC; -18 to -72 VDC; inverted ground option; or
 120/240 VAC at 50/60 Hz (power pack needed for
 SLIM 34)

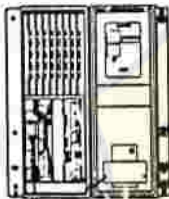
Typical Requirement³

15 W (idle)

Reserve

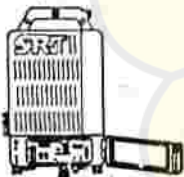
17 Ah with internal battery or 35 to 140 Ah with external
 battery(ies)

SLIM 34



* Four slots still available for VF interface modules

PH



Capacity

2 lines of any service: 2-wire, payphone, 4-wire E&M,
 telex, data, or mixed services; 1 ISDN line

Power

Input Voltage

+13.6 VDC; or 120/240 VAC at 50/60 Hz

Typical Requirement³

15 W (idle)

Reserve

4 to 17 Ah with external battery

COMMON CHARACTERISTICS

- **Environment:**
 - Indoor -10 to +55 °C
 - Outdoor -40 to +55 °C
 - Humidity 95 % (non-condensing)
- A mixture of voice and data services is possible at any station.
- Optional protection at rack-mounted stations and SLIM repeaters (1+1 in monitored hot-standby, hot-standby, or cold-standby mode)
- Line expansion is possible by adding a line or data shelf to a rack-mounted station or by connecting an auxiliary outstation to a SLIM station.
- Rack-mounted stations are designed for indoor installation only.

1 2 3

¹ The given power consumption is based on typical residential traffic loading assuming fully-equipped cabinet stations and half-capacity central and rack-mounted stations with 30 dBm RF transceivers. The actual power consumption will depend on the traffic load, as well as the equipment options selected for primary power voltage, service lines, and standby equipment.

² The SLIM controller provides two 2-wire circuits. The first circuit can be programmed for orderwire or VF service; the second circuit for VF or payphone service. The SLIM controller in through repeaters provides only one 2-wire circuit for orderwire service.

System Characteristics

CONFIGURATIONS

SR500-s systems can be configured in star, branched, or linear networks, to suit the local density of subscribers and topography of the service area. Furthermore, using G.703-compliant network extender modules (NEM), any two SR500-s modules can be linked via existing cable, microwave, and lightwave point-to-point networks.

CAPACITY

The system architecture provides 60, 64 kbps trunks and an addressing capacity of 4,095 lines. All lines have access to all trunks.

In any particular application, the system line capacity is a function of the traffic generated by the connected subscribers and the grade-of-service objective for the area. The single group of 60 trunks provides a two-way traffic capacity in excess of 47 erlangs (1700 CCS). For subscriber lines generating an average traffic of 0.07E (2.5CCS), for a 1% grade of service, 670 subscribers could be served.

For data applications, several low-speed data channels, located at different remote stations, can share the same 64 kbps trunk.

Intracall

The Intracall option connects calls locally between subscribers of the same remote station, reducing the traffic load on the 60 system trunks. Intracall is available at all remote stations, except at micro-outstations and SLM through repeaters.

ATB Intracall

If all 60 trunks are busy, remote stations can connect local calls, using the SR500-s' internal signalling trunks and the Intracall option.

Stand-Alone Intracall

If the central station is out-of service, Intracall can still connect local calls.

SUBSCRIBER SERVICES

Telephone

- 2-wire individual, two-party or multiparty lines
- 2-wire semi-postpay and prepay (50 Hz, 12 kHz, and 16 kHz metering)
- 4-wire E&M signalling

Data

- asynchronous data, 1.2 - 19.2 kbps
- synchronous data, 2.4 - 64 kbps with the capability of remotely programming the data rate
- 64 kbps co- and contradirectional as per ITU-T Rec. G.703 with, or without, E&M signalling

ISDN

- U-interface 2B+D (2B1Q) per ETSI and ANSI standards

Telex

- 50-300 bauds (20 telex lines use 1 DAMA trunk)

Transceiver Characteristics

1.3-2.7 GHz BANDS

Frequency Bands MHz	Minimum Tx-Rx Channel Separation, MHz ²
1375-1452	47
1427-1535	47
1700-1900	57
1900-2100	64
2100-2300	70
2300-2500	77
2500-2690	74

Transmitter RF output power (at antenna port) +10, +20, +30 or +35 dBm, guaranteed¹

10.5 GHz BAND

The SR5 00s equipped with the 10.5 GHz AIM (Antenna Integrated Module) brings fixed wireless access directly to buildings, as well as serving as a radio entrance link between urban and rural settings through the crossband feature.

Frequency band	10.15.0 to 10.300 GHz 10.500 to 10.65.0 GHz
Minimum Tx-Rx channel separation	350 MHz
Transmitter RF output power (at antenna port)	+10, +20 or +28 dBm, guaranteed ¹
Directional AIM	23 dB, 6° beam width
Sectoral AIM	12 dB, 90° beam width

The AIM with the CPR90G waveguide interface is also available.

CHARACTERISTICS COMMON TO ALL RF TRANSCEIVERS

RF input and output impedance	50 Ω, unbalanced
Minimum channel spacing	3.5 MHz is required in accordance with CCIR Reports 380 and 1057, and ITU-R Rec. 701.
Modulation	Modified QPSK
Frequency stability	±5 ppm
Detection	Coherent
Receiver operating range	-45 to -90 dBm
Receiver sensitivity at antenna port	-84 dBm, guaranteed ¹ (for BER of 1×10^{-5})

¹ Note that only the minimum value is given and that other channel separations are possible.

² Guaranteed performance characteristics are those which are met by all equipment operating anywhere within the applicable temperature range.

Interface and Transmission Characteristics

2-WIRE SERVICES

Meets applicable requirements of ITU-T Rec. G.713³

Companded PCM digital encoding standard	A-law or μ -law options, meets ITU-T Rec. G.711 (encoding) and G.713 (VF)
Transmission loss	3dB between 2-wire terminal points Remotely programmable for +3 dB
Level stability	Better than ± 0.6 dB (during one year)
Linearity (variation of gain with input level)	± 1 dB (level range -50 to +3 dBm0)
End-to-end frequency response ⁴	≤ 1.1 dB loss (600- 3000 Hz)
Group delay distortion ⁴	≤ 1.5 ms (600- 2800 Hz)
Idle channel noise (A-law option)	≤ -65 dBm0p (through encoder and decoder) ≤ -75 dBm0p (decoder)
Crosstalk	≤ -65 dBm0
Return loss (nominal impedance) ⁴	> 15 dB (600- 3400 Hz)
Dial pulse distortion	5% max. (8- 12 pps and 55-70% break as measured on a 1310 Ω loop)
VF interface balanced impedance	600 Ω , 900 Ω , or complex options
Longitudinal balance ⁴	≥ 46 dB (600 -2400 Hz)
Signalling limit to telephone exchange	1310 Ω for a minimum loop current of 20 mA
Subscriber loop signalling limit (including the telephone set)	1310 Ω for a minimum loop current of 20 mA 3000 Ω for a loop current of 12 mA (option)
Loop signalling	Rotary dial and/or DTMF
Remote station ringing supply	90 V _{rms} at fundamental frequency of 16, 20, 25, 30, or 50 Hz (factory-set option)
Remote station talk battery	-48 VDC nominal
Payphone metering pulses	50 Hz, 12 kHz, or 16 kHz (bidirectional)

³ In addition to ITU-T Rec. G.713, the SR500-s system meets the applicable requirements of the North American standard TR-TSY 00 00 57, issue 2, January 1993.

⁴ Selected frequency range shown, but equipment meets full voice band specifications as per ITU-T Rec. G.713.

4-WIRE E&M SERVICES

All specifications meet ITU-T Rec. G.712.

Companded PCM digital encoding standard	A-law or μ -law options, meets ITU-T Rec. G.711
Transmit and receive levels	Rx out +7 to -16 dBm Tx in -16 to +7 dBm
Transmit and receive return loss	≥ 20 dB (300 - 3400 Hz)
Longitudinal balance	≥ 46 dB longitudinal conversion loss (300 - 2400 Hz)
Crosstalk, interchannel	≤ -65 dBm ₀ using 1 kHz tone
Idle channel noise (A-law option)	≤ -65 dBm _{0p} (nominal termination) ≤ -75 dBm _{0p} (receiving equipment noise)
Level stability	Better than ± 0.5 dB during any one year period
Linearity (variation of gain with input level)	± 1 dB (level range ± 0 to $+3$ dBm ₀)
End-to-end frequency response*	≤ 0.9 dB loss (300 - 3000 Hz)
Group delay distortion*	≤ 1.5 ms (500-2800 Hz)

DATA TRANSMISSION SERVICE

The G.703 co- and contradirectional, 64 kbps interface module has two bidirectional E&M signalling channels for requesting the services of trunks using the demand access mode.

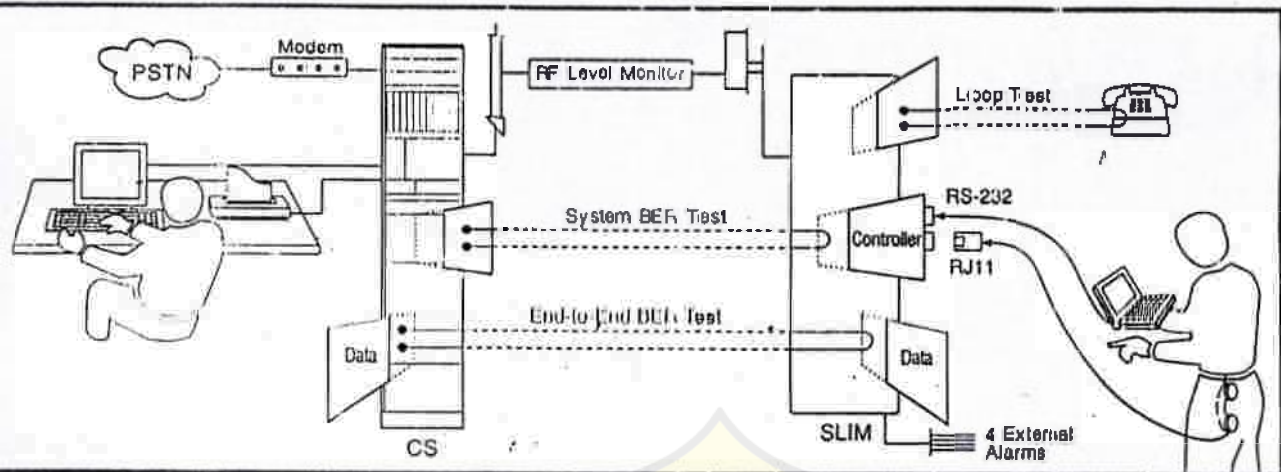
ITU-T/EIA	Data Rate (kbps)	Data Rate Selection
Synchronous		
• V.24/RS-232C	2.4-19.2	Remotely programmable
• V.11/RS-422A	2.4-64.0	Remotely programmable
• V.35	2.4-64.0	Remotely programmable
• G.703 co- and contradirectional	64.0 (E&M ₁ ; E&M ₂)	Fixed
Asynchronous		
• V.24/RS-232C	1.2-19.2	Selected through jumpers

Synchronous and asynchronous data circuits running at the same data rate can be submultiplexed to occupy a single 64 kbps trunk. The number of data circuits per trunk is dependent on the data rate:

An SR500-s system supports any mixture of data circuits running at different data rates.

Data Rate (kbps)	Data Circuits Per Trunk	Data Rate (kbps)	Data Circuits Per Trunk
1.2	20	9.6	5
2.4	20	19.2	2
4.8	10	38.4 to 64.0	1

Network Management System



OPERATION AND MAINTENANCE

The SR500-s includes a comprehensive set of tools and features for managing the network. Included are:

- On-line diagnostics;
 - Real-time monitoring and alarm-reporting subsystems;
 - Menu-driven user interface;
 - Automatic identification of system configuration;
 - Dynamic line addressing;
 - Four security levels.
- Access to these powerful tools and features is via a video display terminal or any type of PC, located at the central station site or anywhere on the public switched telephone network (PSTN).

ALARMS

SR500-s stations have built-in alarms to report failures in the transmission, controller, and power subsystems. All alarms are reported to the central station which, in turn, notifies the network manager through visual indicators, error messages, and dry-contact relays (NO or NC).

Further Reading Material

Brochure sheets providing additional details and specifications are available for individual remote stations, options, and auxiliary equipment.

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CONTINUOUS QUALITY TESTING

Compliant with the ITU-T G.821 recommendation, the SR500-s CQT facility provides network managers with a range of tests that verify the quality of the network. Included are BER tests, RF level tests, and loop tests.

System BER Tests (optional) - verify the quality of transmission between the central station and any remote station. It can test one remote station, all remote stations using one trunk, or all remote stations using two trunks.

End-to-End BER Tests (optional) - exercise the circuit between two synchronous data connections, the one at the central station and the corresponding one at the remote station.

Dynamic RF Level Monitoring (optional) - enables system nodes to report the strength of the RF signal being received from downstream remote stations. Reporting is done in real time, and the signal level is measured in dBm.

Loop Tests - verify the integrity of the copper loop connecting the 2-wire interface module to the subscriber's telephone. They can test a single loop, a range of loops, or one or more loops at a specific time (programmable).

All tests are built into the SR500-s system and require no additional test equipment. They can be initiated from either the local or remote video display terminal and can run in the background while the user performs other menu-driven functions.

Test results can be printed, stored on the mass storage unit, or just displayed in real time.

ORDERWIRE

The orderwire option provides maintenance personnel with a service line that they can use when co-ordinating activities amongst themselves. Through this line, they can place a call to a particular station or broadcast a message.

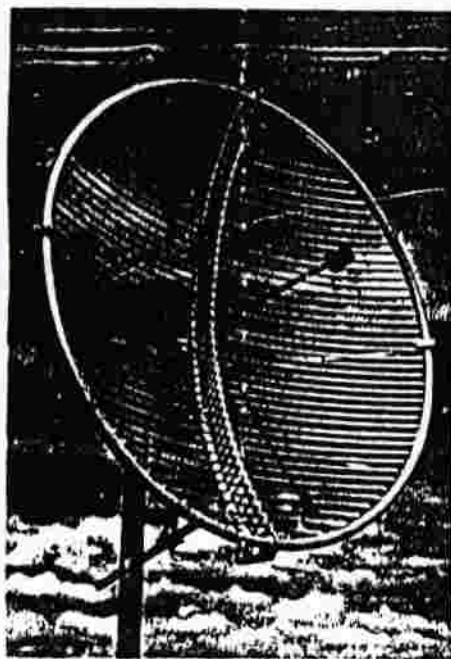
MASS STORAGE UNIT

Effective network management requires large storage capacity for system status, alarms, test results, and traffic statistics. The central station provides a solid-state, mass storage unit that can store 20,000 event reports, which under normal operating conditions represent a minimum of six months of historical data. Event reports can also be sent to an external printer, PC or transferred to a portable flash memory card.

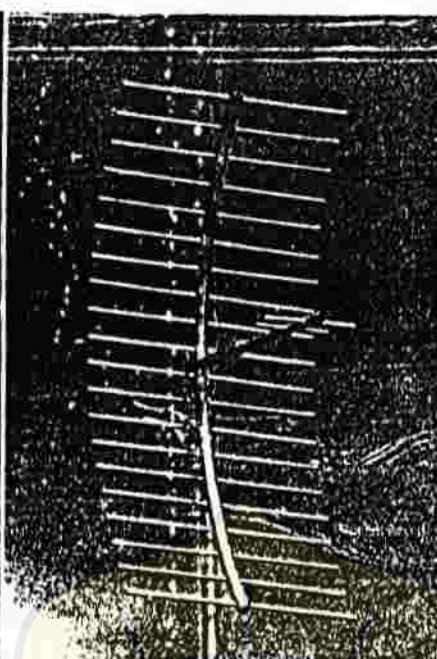
SR Telecom Inc.

8150 Trans-Canada Hwy
St. Laurent, Quebec
Canada 1a 4A5 1M5

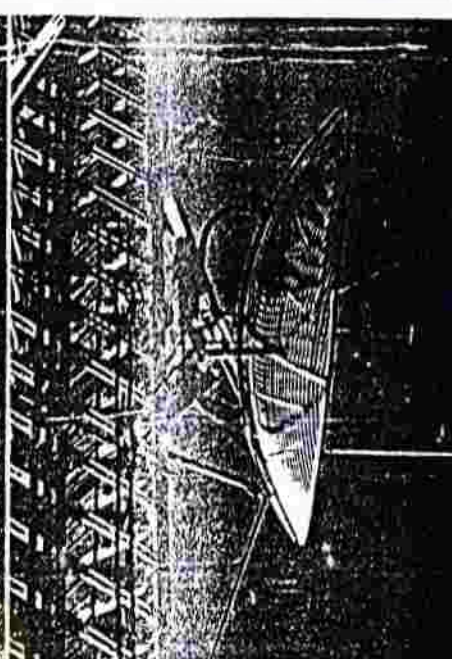
Tel: (514) 335-1210
Fax: (514) 334-7783
Telex: 05-824519



GRIDPAK Antenna (KP Series)
SUPER GRID (SG Series)



Mini GRIDPAK Antenna (MKP Series)



Grid Antenna (GP Series)

Grid Antennas

GRIDPAK® Antennas (KP Series)

Grid Antennas (GP Series)

SUPER GRID® (SG Series)

Mini GRIDPAK Antennas (MKP Series)

Andrew GRIDPAK and Mini GRIDPAK Antennas are low-windload grids which reduce transportation costs in remote areas because they are shipped totally disassembled in a light-weight flat package.

- Grid design provides precision reflector performance at minimum wind load drag
- Integral mount means simplified installation on site
- Constructed to eliminate metal fatigue failures for long service life
- Manufactured in Britain and Australia and some are stocked in North America
- Lightweight for easy handling

GP Series Grid Antennas are welded tube, low wind load reflectors.

- 8 ft diameter and larger models ship in two sections for reduced shipping and handling costs
- Available with foam-filled and air dielectric feeds to assure system compatibility
- Vertical tower mount included
- Non-corrosive long-life construction

Grid Antennas should be considered when low wind loads onto supporting structures are required and in remote areas where transportation problems exist. These antennas provide low-cost, high-reliability performance.

SUPER GRID Antennas are low wind load GRIDPAK antennas assembled and stocked in North America.

- Grid design provides precision reflector performance at minimum wind drag
- Loose tubular reflector construction to eliminate metal fatigue for long service life
- Integral mount included
- Lightweight for easy handling

Microwave Antennas, 2.3-2.7 GHz

Unpressurized Antennas

"F"-series antennas are designed for high reliability without need of pressurization. This eliminates the cost of pressurization equipment and reduces maintenance costs.

Low Windload

of grid and GRIDPAK® antennas results in 30% reduction in tower loading. GRIDPAK antennas are shipped disassembled for low cost transportation to remote areas.

U.S. FCC Pattern Compliance is indicated in the tables.

Vertical Tower Mount is included with all antennas. See pages 95 and 96 for further information.

Pressurization. Single polarized air-dielectric feeds are pressurizable to 10 lb/in² (70 kPa). Dual polarized feeds are pressurizable to 3 lb/in² (20 kPa). F Series unpressurized feeds are foam filled and eliminate the need for pressurization equipment.

Termination Load for unused port of dual polarized antenna, 1.7-2.3 GHz.

Flange Type 7/8" EIA, 50 ohm, Type 43734

To Order, Specify Antenna Type Number. Refer to page 53 for general ordering information.

Further information. For general information on microwave antennas see pages 40-53. For information on applications and related products see the index on page 39.

Other Available Antennas

Contact Andrew for Further Information

2.3-2.5 GHz	2.40-2.7 GHz
GP6F-23D	HP4-25
GP8F-23D	FP4-25
GP10F-23D	

2.3-2.5 GHz Antennas - Electrical Characteristics

Frequency GHz	Input Flanges	Type Number	Diameter # (m)	Gain, dBi			Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
				Bottom	Mid-Band	Top				
Focal Plane Antennas, Air Dielectric**										
2.3-2.5* Single Polarized	7/8" EIA 50 ohm	FP4-23D	4 (1.2)	26.2	26.5	26.9	7.7	30	40	1.20 (20.8)
		FP6-23D	6 (1.8)	29.8	30.4	30.8	5.3	28	41	1.15 (23.1)
		FP8-23D	8 (2.4)	32.6	32.7	33.0	4.1	30	52	1.10 (26.4)
		FP10-23D	10 (3.0)	34.7	34.8	35.3	3.4	30	53	1.08 (28.3)
		FP12-23D	12 (3.7)	35.8	36.4	36.6	2.8	30	57	1.08 (28.3)
2.3-2.5* Dual Polarized	7/8" EIA 50 ohm	FPX6-23C	6 (1.8)	28.9	29.2	29.6	5.5	27	41	1.15 (23.1)
		FPX8-23C	8 (2.4)	31.5	31.8	32.3	4.1	28	52	1.10 (26.4)
		FPX10-23C	10 (3.0)	33.8	33.9	34.2	3.3	29	54	1.08 (28.3)
		FPX12-23C	12 (3.7)	35.5	35.6	35.9	2.7	30	56	1.08 (28.3)
Focal Plane Antennas, F-Series Unpressurized**										
2.3-2.5* Single Polarized	"F" Flange Female	FP4F-23D	4 (1.2)	26.1	26.4	26.8	7.7	30	40	1.30 (17.7)
		FP6F-23D	6 (1.8)	29.7	30.3	30.5	5.3	28	41	1.25 (19.0)
		FP8F-23D	8 (2.4)	32.5	32.6	32.9	4.1	30	52	1.20 (20.8)
		FP10F-23D	10 (3.0)	34.6	34.7	35.2	3.4	30	53	1.15 (23.1)
		FP12F-23D	12 (3.7)	35.7	36.3	36.5	2.8	30	57	1.15 (23.1)
Low VSWR Standard Antennas, Air Dielectric										
2.3-2.5* Single Polarized	7/8" EIA 50 ohm	PL6-23D	6 (1.8)	30.5	30.8	31.2	4.8	28	36	1.10 (26.4)
		PL8-23D	8 (2.4)	33.0	33.4	33.7	3.5	30	39	1.08 (28.3)
		PL10-23D	10 (3.0)	34.9	35.3	35.7	2.8	30	42	1.08 (28.3)
		PL12-23D	12 (3.7)	36.5	37.0	37.2	2.5	30	44	1.08 (28.3)
Standard Antennas, F-Series Unpressurized										
2.3-2.5* Single Polarized	"F" Flange Female	P4F-23E	4 (1.2)	26.9	27.3	27.6	6.9	32	36	1.20 (20.8)
		P6F-23E	6 (1.8)	30.4	30.8	31.2	4.7	32	36	1.20 (20.8)
		P8F-23E	8 (2.4)	33.0	33.4	33.8	3.5	30	39	1.15 (23.1)
		P10F-23E	10 (3.0)	34.9	35.3	35.6	3.0	30	44	1.15 (23.1)
		P12F-23E	12 (3.7)	36.5	36.9	37.2	2.5	32	47	1.15 (23.1)
GRIDPAK® Antennas, Air Dielectric**										
2.3-2.5* Single Polarized	7/8" EIA 50 ohm	KP4-23	4 (1.2)	27.3	27.6	27.9	6.9	30	30	1.20 (20.3)
		KP6-23	6 (1.8)	31.1	31.4	31.7	4.5	30	36	1.10 (26.4)
		KP8-23	8 (2.4)	32.7	33.0	33.2	3.4	30	35	1.08 (28.3)
		KP10-23	10 (3.0)	34.6	34.9	35.2	3.0	30	38	1.08 (28.3)
		KP13-23	13 (4.0)	37.1	37.3	37.6	2.4	30	38	1.08 (28.3)
GRIDPAK Antennas, F-Series Unpressurized***										
2.3-2.5* Single Polarized	"F" Flange Female	KP4F-23	4 (1.2)	27.2	27.5	27.8	6.9	30	30	1.20 (17.7)
		KP6F-23	6 (1.8)	31.0	31.3	31.6	4.5	30	36	1.20 (20.8)
		KP8F-23	8 (2.4)	32.6	32.9	33.1	3.4	30	35	1.15 (23.1)
		KP10F-23	10 (3.0)	34.5	34.8	35.1	3.0	30	38	1.15 (23.1)
		KP13F-23	13 (4.0)	37.0	37.2	37.5	2.4	30	38	1.15 (23.1)

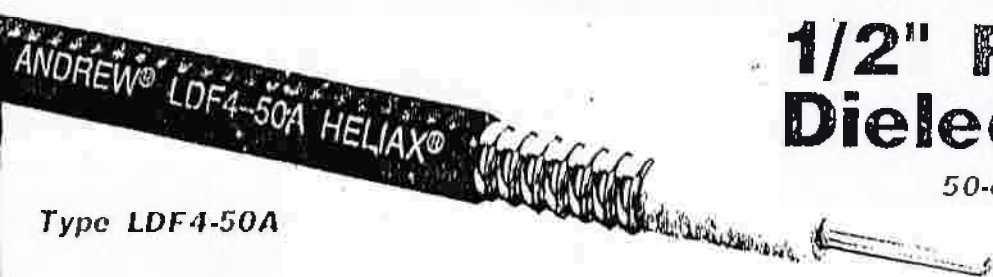
*2.3-2.7GHz antennas available on special order with increased VSWR. Specifications available on request.

**Focal plane antennas are manufactured and stocked at our factory in Great Britain and are manufactured on special order

in Australia. They are not manufactured or stocked in the United States or Canada.

***GRIDPAK antennas are shipped disassembled for low cost transportation to remote areas.

HELIX[®] Coaxial Cable



1/2" Foam Dielectric

50-ohm

Type LDF4-50A

Superior to Braided Cable

Solid copper corrugated outer conductor results in low loss, high power handling and continuous RF/EMI shielding to minimize interference and maximize system security. Cable can be curved to a 5 in (125 mm) radius.

Weatherproof

Annular corrugations prevent water migration. Connector O-rings seal out moisture. Closed cell foam prevents water penetration.

Quick and Easy Connector Attachment

Patented, self-flaring design.

Low Loss Foam

Pressurization not required.

Proven performance in applications such as:

- Land mobile radio and cellular radio.
- Earth station jumper cables and jumpers for equipment room and antenna connections.
- Phase stabilized versions for phased array radars and broadcast sampling lines.
- Mil-spec versions available.

Low VSWR Cable

Type LDF4P-50A is a low-VSWR version of LDF4-50A. Low VSWR specifications are tabulated on page 292A. Achievable VSWR is a function of maximum operating frequency, connector interfaces and cable length. The figures are guaranteed for factory assemblies and are typical for field cut lengths. If two different interfaces are used, the higher VSWR value is the guarantee.

Low VSWR cable for cellular radio is listed in the "Characteristics" table.

Characteristics

Nominal Size	1/2"
Impedance, ohms	50

Cable Type Numbers

Standard Cable, Standard Jacket	LDF4-50A
Standard Cable, Fire-Retardant, Non-Halogenated Jacket	LDF4RN-50A
Specialty Tested and Selected Cable	
Low-VSWR Cable	LDF4P-50A
(Specify Operating Band, see table below)	
Cellular Radio	
824-960 MHz, 1.12 max. VSWR	LDF4P-50A-1
880-960 MHz, 1.10 max. VSWR	LDF4P-50A-2
Qualified to MIL-C-28830/3	202071-1
Standard Jumper Assemblies	see p. 411
Cellular Radio Jumper Assemblies	see p. 36
Phase Stabilized and Phase Measured Cable	see p. 350

Electrical Characteristics

Maximum Frequency, GHz	8.8
Velocity, percent	80
Peak Power Rating, kW	19
DC Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.40)
Outer	0.58 (1.90)
DC Breakdown, volts	4000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	23.1 (75.0)
Inductance, μ H/ft (m)	0.058 (0.190)

Mechanical Characteristics

Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.63 (16)
Diameter over Copper Outer Conductor, in (mm)	0.55 (14)
Nominal Inside Transverse Dimensions, (mm)	1.11
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-in (N-m)	2.8 (3.8)
Cable Weight, lb/ft (kg/m)	0.15 (0.22)
Tensile Strength, lb (kg)	210 (113)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (2.0)