ATTACHMENT 1

4. Particulars of Operation:

Frequency or frequency Bands (kHz, Mhz or GHz) (A)	Maximum RF output power at transmitter (specify units) (B)	Insert maximum effective radiated power from the antenna (C)	Insert "Mean" or "Peak" as defined in Part 5 (D)	List the emission designator for each freq. (E)	Signal Modulation (F)	Describe how the necessary bandwidth was determined (G)
Basestation (Downlink):						
3475.688 - 3492.688 MHz	30 dBm (1 watt) per carrier)	omni-directional: 40 dBm (10 watts) EIRP 120 degree sectored: 45 dBm (31 watts) EIRP (excluding cable losses)	Mean	Q7W (type of information is C, D & E - facsimile, data and telephony)	$\pi/4$ DQPSK modulating a 10 timeslot TDMA carrier	carrier spacing: 307.2 kHz maximum of 54 carriers in frequency plan, 280 kHz guard band at both ends of band
Subscriber Unit (Uplink):						
3425 - 3442 MHz	27 dBm (0.5 watt) per subscriber for 3 timeslots	45 dBm (31 watts) EIRP per subscriber	Mean	Q7W (type of information is C, D & E - facsimile, data and telephony)	$\pi/4$ DQPSK modulating a 10 timeslot TDMA carrier	carrier spacing: 307.2 kHz maximum of 54 carriers in frequency plan, 280 kHz guard band at both ends of band

ATTACHMENT 2

6. Is a directional antenna used? Yes _X__ No ____

If "Yes" give the following information:
Width of beam in degrees at the half-power point:

Basestation:	Elevation: 8 degrees Azimuth: 360, 180, 120 or 60 degrees Antennas can be vertically or horizontally polarized Orientation in horizontal plane: per site requirements Orientation in vertical plane: 0-2 degrees downtilt from horizontal
Subscriber Unit:	20 degrees in azimuth and elevation, with vertical or horizontal polarization Orientation in horizontal plane: per site requirements Orientation in vertical plane: per site requirements

ATTACHMENT 3

3.0 DESCRIPTION OF EQUIPMENT AND THEORY OF OPERATION

3.1 GENERAL SYSTEM CONFIGURATION

The Nortel PROXIMITY-I™ Fixed Wireless Access (FWA) system provides a means of connecting subscribers to a telecommunications network using a radio link in place of the more traditional method of copper cable. A radio transceiver mounted on the subscriber premises, called a Residential Service System (RSS), communicates by near line-of-sight links with a basestation. Multiple basestations can be deployed in a cellular arrangement to cover a wide geographic area.

Each basestation is connected to a PSTN local exchange, e.g. a Nortel DMS-100, as shown in the diagram below, via conventional T1 transmission links using fiber or point-point radio. Each RSS provides two subscriber lines that can accept any normal analog telephone equipment for access to the PSTN.

The FWA Element Manager works together with each of the network elements to allow the network to be operated from management terminals located at a single control center.

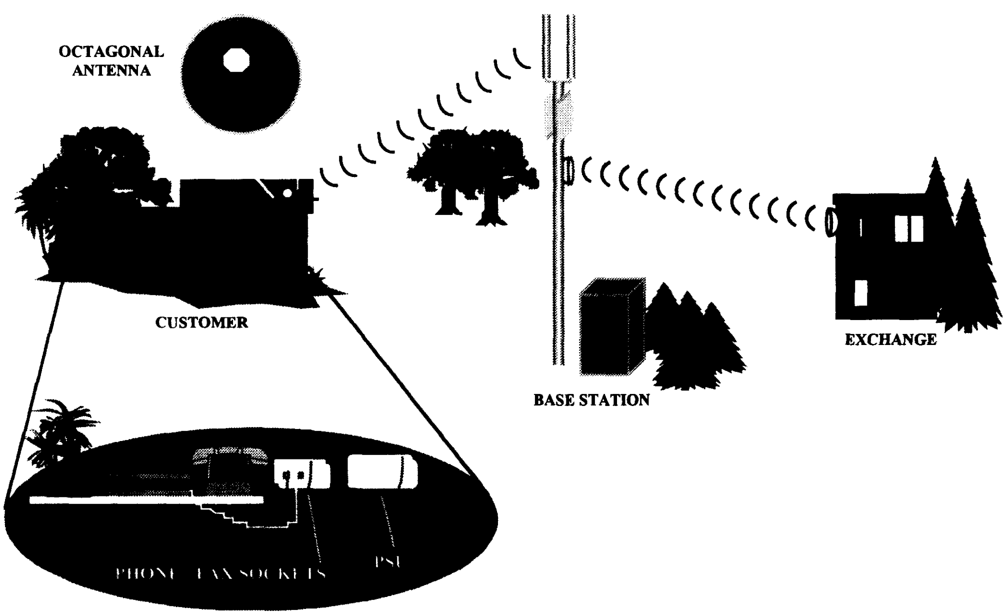

Figure 1 - PROXIMITY-I™ System Configuration

The system parameters have been selected to provide the optimum combination of range, services, call quality and cost for local loop fixed applications. Features include:

- Standard subscriber apparatus: telephone, answer machine, FAX, modem
- Multiple subscriber lines
- High basestation range providing wide area coverage for low investment

3.2 PROXIMITY I BASESTATION

The basestation comprises one or more Transceiver Masthead Units (TMU) together with a processor unit to be installed inside a basestation shelter.

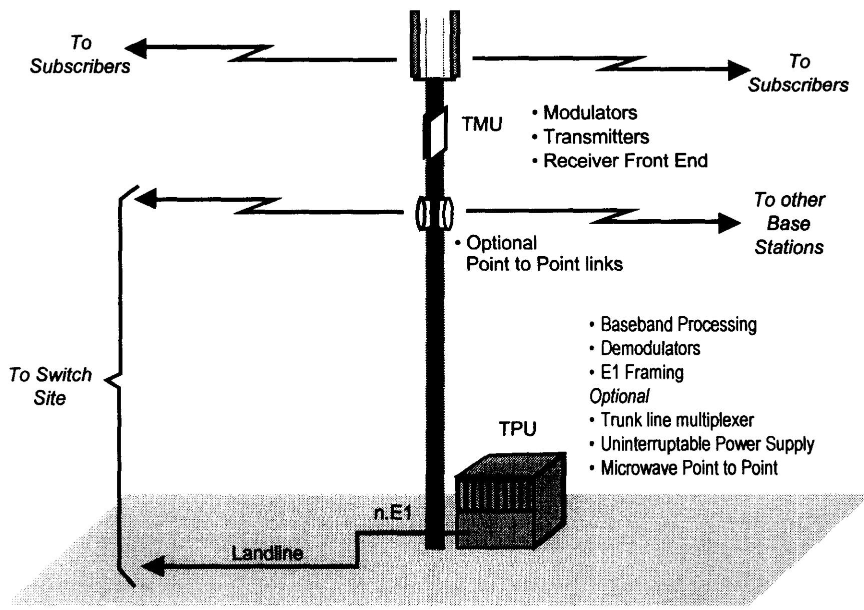

Figure 2 - PROXIMITY-I™ Basestation

The basestation is configurable, in multiples of 3, between three and eighteen bearers. The term "Bearer" refers to the number of radio channels that the basestation is equipped to operate in simultaneously. Each "radio channel" comprises a receive carrier and transmit channel separated by a fixed spacing in frequency (i.e. frequency division duplex @ 50.688 MHz).

The physical layer of the air interface is a full duplex TDMA system with 54 RF channels in two 17 Mhz sub-bands between 3.4 and 3.5 GHz. Each RF channel is structured to provide 10 timeslots. Each timeslot can be used for acquisition or traffic. For speech traffic, the basestation transcodes 64Kbps PCM speech to 32 Kbps ADPCM which is mapped to a single RF timeslot. For voice-band data traffic (including FAX) the RSS implements a modem detection algorithm and directly maps the 64 Kbps PCM onto two RF timeslots. Each transceiver is capable of being configured, under continuous control, to any RF channel.

3.3 CUSTOMER PREMISES EQUIPMENT

The Customer Premises Equipment for the PROXIMITY-I™ system, the Residential Service System (RSS), includes a Radio Transceiver Unit (RTU) with integral antenna which is located on the outside of the customers premises. The external equipment is both weather proof and vandal proof, and is supplied with a suitable mounting bracket.

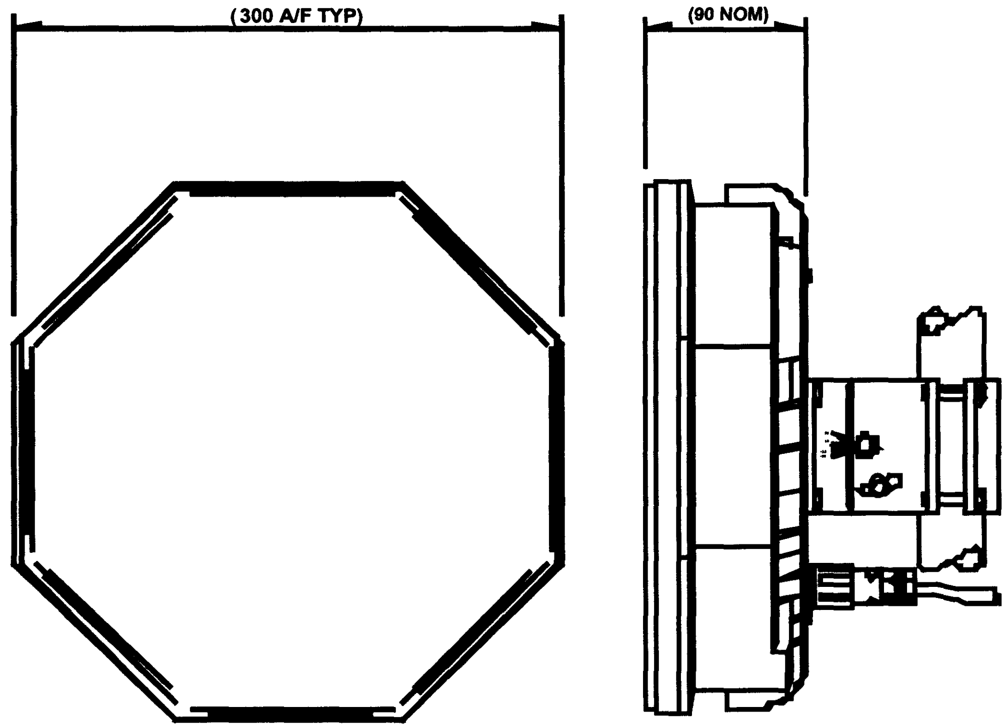

Figure 3 - PROXIMITY-I™ RTU

The RSS is fitted with an integral directional antenna, requiring near line-of-site visibility of the basestation. The system can be installed to provide a better Bit Error Rate (BER) than for mobile systems and the installation ensures that any multipath and fading effects are shallower and slower than those for mobiles. The system has been designed to meet the BER objectives of CCITT standards for end to end 64kbit/s transmission links.

A weatherproof junction unit facilitates interconnection between the RTU and the power unit and telephone jack sockets (RPU and CJU) which are mounted inside the customer premises. This configuration supports the interfacing of standard 2-wire DTMF telephones, FAX machines, data modems, answering machines and cordless telephones.

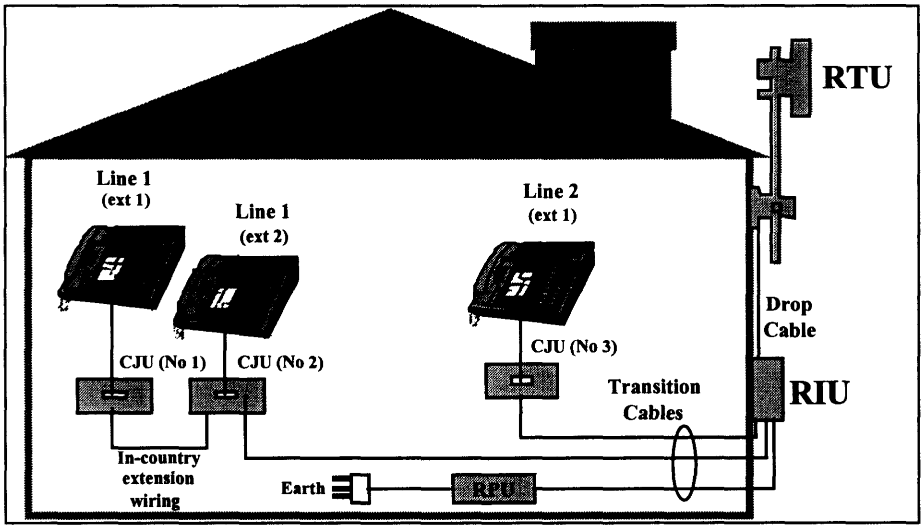

Figure 4 - RSS Installation Configuration

The RSS provides the customer with up to two independent analog lines. When the second line is required, it can be enabled over the air interface by a software command without the need for either a site visit or additional hardware.

Functionality of standard telephone equipment, when attached to the RSS, is unchanged from the situation where direct wired connection is made to the PSTN. Full service transparency is provided for both speech or data transmission from Group 3 FAX machines and voice band data modems to 56 Kbps.

3.4 SYSTEM CAPACITY, MODULARITY AND RANGE

The PROXIMITY-I™ basestation can be constructed and configured on a modular basis to provide 3 to 18 radio bearers, each with 10 time slots, giving 30 to 180 voice channels.

Applying traffic levels of 120mE and 60mE, often considered typical for business and residential customers respectively, with less than 1% probability of call blocking, the theoretical subscriber capacities shown below apply to the basestation configurations shown.

	Voice Slots	Erlangs	Customers supported @ 120 mE	Customers supported @ 60 mE
3 Bearer Omni	30	20	165	330
6 Bearer Omni	60	46	383	767
18 Bearer Tri-Sector	180	138	1,150	2,300

Table 1 - Basestation Capacities

The figures given above show total traffic capacity capabilities for each PROXIMITY-I™ basestation configuration, and potential subscriber-line quantification based on the stated traffic ratings.

Subject to site surveys, PROXIMITY-I™ will provide coverage of up to 20 km radius, in a rural environment. In a city environment the typical cell radius will be reduced by the need to provide sufficient capacity in the locality and avoid clutter. The minimum cell size is 200m which will accommodate very high customer / traffic density. Further range increases can be achieved when terrain and propagation issues allow - e.g. line of sight operation, or by special engineering.

3.5 OPERATIONAL CHARACTERISTICS

3.5.1 Operational Frequencies

The frequency allocation for the PROXIMITY-I™ - FWA system complies fully with the guidelines issued by CEPT/ETSI. In order to deploy a network of base stations providing complete geographic coverage of an area by re-using frequencies on a cellular basis, allocation by the administration of two frequency bands each 17 MHz wide with a duplex spacing of 50 MHz (per Annex A of CEPT channel plan above) is required. 3425.00 to 3442.00 MHz is used for the up-link from the customer terminals to the base stations and 3475.688 to 3492.688 MHz for the basestation downlink.

Frequency Plan

The full band is split into 54 frequency bearers with a channel spacing of 307.2 kHz. Each frequency bearer provides a full duplex radio channel split into ten 32 kbps time slots by using a Time Division Multiple Access (TDMA) modulation scheme. The system employs frequency division duplex operation with downlink and uplink bands separated by 50.688 Mhz.

The frequency requirements of the FWA system are provided below.

Spectrum Allocation

The band allocation should allow the exact channels used to be chosen from the formula below.

Frequency Channel Table (Centre Frequencies)	
Uplink frequency (to basestation)	3425.2800 + (n x 0.3072) MHz
Downlink frequency (from base)	3475.9680 + (n x 0.3072) MHz

Channels are numbered from n = 0 to 53 inclusive

A basestation can operate from a selection of the 54 bearers available in the frequency plan, the frequencies being turned on or off remotely under the control of the Proximity-I Element Manager (EM) or at the Base Station site via a Field Engineering Terminal (FET). Changing the frequency channels of the Base Station is achieved by software re-program only, with no alteration to the hardware. The Residential Service System (RSS) is designed to automatically adjust to the complete range of frequencies available in the cell.

ETSI TM4 Equipment Parameters Approval Specification

A European-wide equipment standard for radio access systems is defined by the ETSI TM4 (Transmission and Multiplexing) group. The standard of relevance here is that for TDMA Point to Multipoint Digital Systems in the 3 to 11 GHz Band (reference DE/TM-04020). This defines details of the radio equipment parameters to enable authorities to ensure co-existence with other approved radio systems operating in adjacent bands. The specification defines standard network interfaces and allows operators to transparently connect subscribers to the public telecommunication network. Nortel has contributed to the ETSI TM4/2 preparatory working group and the Proximity-I product fully complies with this new ETSI 3 - 11 GHz P-MP equipment standard. The standard has been approved by TM4, having entered the Public Enquiry stage, and it is expected to be formally ratified shortly.

An associated new ETSI standard is the 3 -11 GHz P-MP Antenna Standard which is in the final stages of preparation. This new standard is expected to be approved and enter Public Enquiry stage in the near future. The Nortel Proximity-I product is the first such P-MP (wireless access) system to comply with this new antenna standard.

3.5.2 Link Budgets

The following radio path link budgets illustrate a typical omni-directional cell configuration of Proximity-I.

Receiving End	Base Station	RSS
Ed/No Min (1 x10^{-3} BER)	7.5 dB	7.5 dB
Rx Implementation Loss	1.0 dB	1.0 dB
Gross Bit Rate	512 kbps	512 kbps
Noise Figure	6.0 dB	6.0 dB
Receiver Sensitivity	-102.4 dBm	-102.4 dBm
Cable Loss + Connector Loss	1.5 dB	0.0 dB
Rx Antenna Gain	10.0 dBi	18.0 dBi
Rx Isotropic Power (50%Ps)	-110.9 dBm	-120.4 dBm

Transmitting End	RSS	Base Station
RF Peak Power (ant connector)	27.0 dBm	30.0 dBm
Cable Loss + Connector Loss	0.0 dB	1.5 dB

Tx Antenna Gain	18.0 dBi	10.0 dBi
Peak EIRP	45.0 dBm	38.5 dBm
Tx Implementation Loss	1.0 dB	0.5 dB

Total Link Budget	**Uplink**	**Downlink**
Isotropic Path Loss (50%Ps)	154.9 dB	158.4 dB

Table 2 - Typical Baseline Omni-Sector Cell Link Budget (No Margins)

The following radio path link budgets illustrate a typical tri-sectored cell configuration of Proximity-I.

Receiving End	**Base Station**	**RSS**
Ed/No Min (1 x10^{-3} BER)	7.5 dB	7.5 dB
Rx Implementation Loss	1.0 dB	1.0 dB
Gross Bit Rate	512 kbps	512 kbps
Noise Figure	6.0 dB	6.0 dB
Receiver Sensitivity	-102.4 dBm	-102.4 dBm
Cable Loss + Connector Loss	1.5 dB	0.0 dB
Rx Antenna Gain	14.0 dBi	18.0 dBi
Rx Isotropic Power (50%Ps)	-114.9 dBm	-120.4 dBm

Transmitting End	**RSS**	**Base Station**
RF Peak Power (ant connector)	27.0 dBm	30.0 dBm
Cable Loss + Connector Loss	0.0 dB	1.5 dB
Tx Antenna Gain	18.0 dBi	14.0 dBi
Peak EIRP	45.0 dBm	42.5 dBm
Tx Implementation Loss	1.0 dB	0.5 dB

Total Link Budget	**Uplink**	**Downlink**
Isotropic Path Loss (50%Ps)	158.9 dB	162.4 dB

Table 3 - Typical Baseline Tri-Sector Cell Link Budget (No Margins)

Table 2 shows that the omnidirectional link budget is uplink limited with a maximum path loss without margins of 154.9 dB. The tri-sector link budget is similarly uplink limited with a maximum path loss without margins of 158.9 dB. The implementation loss included in the receiver sensitivity figure accounts for non-ideal demodulator performance. This has been measured as 1 dB in both the RSS and Base Station. The link budget is reduced further by a transmit implementation loss to account for non-ideal modulator and transmit chain performance. This is 0.5 dB for the Base Station and 1 dB for the RSS. The Tx Implementation Loss does not affect the EIRP figure but represents the loss that would be observed if the signal were demodulated by an ideal receiver.

The probability of achieving an acceptable BER (called the Probability of Service - Ps) can be described in terms of time and location. At a fixed location, the signal strength will vary due to temporal fading. Over a given area, the signal strength will vary due to terrain and obstacle shadowing even under non-fading conditions. In reality, the Probability of Service is dependent on the effects of time and location.

At the maximum path loss defined by the baseline link budget a subscriber would statistically experience a signal strength that fell below the receiver sensitivity for 50% of the time. In terms of location, 50% of locations along the cell perimeter will statistically have a median signal strength that falls below the receiver sensitivity. This clearly illustrates that in the majority of cases additional margins will be required on top of the baseline link budget.

In common with other radio access and cellular systems these additional margins will be needed to account for temporal fading, area coverage objectives, co-channel and adjacent channel interference, and anomalous propagation effects. The value of the margin required will depend on the nature of deployment, the local environment and operator-dependent radio network design objectives. Since tens of dB's maybe involved in these margins, careful assessment of the Operator's objectives is essential.

3.5.3 Margins

Shadow Margin and Area Coverage

In common with other radio access and cellular systems, shadowing due to terrain and other obstacles will be encountered. Thus a percentage of locations within a cell will have a median signal strength that falls below the receiver sensitivity. To increase the area coverage within a cell a shadow margin is added to the link budget. This has the effect of reducing the cell radius down from the noise-limited range.

The percentage area covered acceptable to an operator usually ranges between 75-99%. The requirements may differ from urban to rural areas. In calculating coverage quality, improvement can be obtained by considering basestation diversity. The figure below shows how the area coverage varies with the Shadow Margin for both a single server basestation and the situation where a second basestation is available.

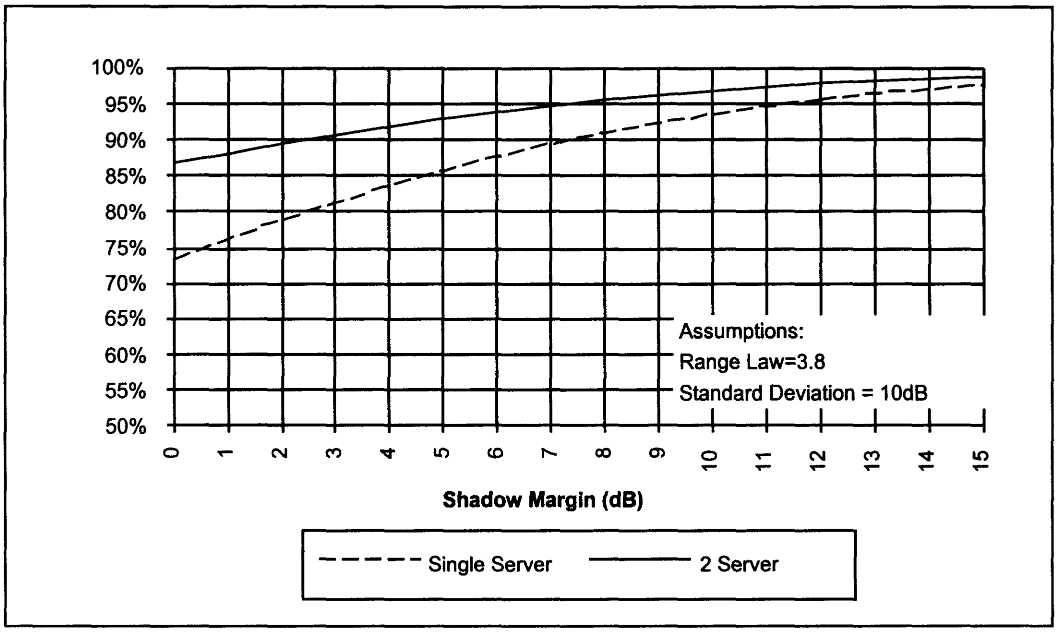

Figure 5 - RF Coverage vs. Shadow Margin

A variation in shadow margin from 0 dB and 15 dB corresponds to a reduction in range by a factor of approximately 2.6. Therefore, the Operator's choice on percentage area coverage has a large impact on the link budget. In calculating the shadow margin required it has been assumed that the Propagation Range Law is -3.8, the Base Station antenna height is 20 m and the RSS height is 7 m.

Temporal Fade Margins

The two way radio link between a Base Station and an RSS will be subject to short term fluctuations in signal levels over time. The radio channel will not be subject to the severity of fading as that normally seen in mobile cellular systems due to the directional antenna of the RSS which is fixed and is normally mounted high relative to local clutter.

The effect of temporal fading is only considered in terms of radio link availability. Radio link availability is a long term measurement that describes the percentage of time that the signal strength is sufficient to provide a raw BER of 10-3. Nortel's working assumptions are as follows.

Percentage of Time Signal Strength above Threshold	Temporal Fade Margin (dB)
90.0%	4.2
99.9%	10
99.95%	10.7
99.99%	12

Table 6 - Temporal Fade Margins

Interference Margin

A margin is required to account for sensitivity degradation due to co-channel and adjacent channel interference. The precise value required will depend upon the particular deployment and may not be the same for the uplink and the downlink. The recommended working assumptions of interference margin is 2 dB for both the uplink and downlink

Other link budget margins

Additional link budget margins may be required in addition to the above. These margins are to make an allowance for the following:

- Local clutter around the RSS, e.g. local foliage that will introduce typical losses of approximately 9.1 dB per metre of foliage.

- Heavy rainfall may require an additional link margin for high availability links in geographical areas prone to such conditions. Calculations based on the CCIR reports and recommendations suggest a working assumption of 2 dB margin for 99.999% availability in tropical regions. Temperate climates will not require additional margin for rainfall.

- Multipath propagation from specular reflections from tall buildings, mountains, etc. could cause multipath to occur. The directional RSS antenna will usually introduce a significant attenuation into the delayed signals relative to the direct signal.

3.5.4 Propagation Immunity

Several aspects have been taken into consideration in the architectural design of the all-digital Proximity - I product range. These include:

- Air Interface Protocol - fundamental frequency choice from a choice of multiple access methods (e.g. FDMA, TDD, TDMA, SH-FDMA, NB-CDMA, BB-CDMA etc.); modulation type; frame structure; coding; error protection; timing protocols; pilot usage etc.
- Design Implementation - degree of RF filtering, antenna performance, margins incorporated etc.

- RF Planning - procedures adopted, design rules

The following points are considered particularly relevant in understanding how the Proximity-I product effects superior immunity to interference and propagation degradation mechanisms:

- all digital, TDMA system
- integral directional antenna within the subscriber unit (RSS), with approximately 20 degrees -3 dB beamwidth
- for all but the smaller basestation arrangements (lowest capacities, where omni arrangements can be used) a tri-sectored configuration is used; modeling of RF network deployments in various scenarios have confirmed the optimal nature of this highly bi-directivity scheme
- use of polarization discrimination at the RSS. This is integral within the design and forms part of the RF planning process, with no extra effort in installation
- integral equalisation using appropriately robust, intra-frame training sequence
- sound $\pi/4$ QPSK modulation scheme, as used widely in IS-54+ D-AMPS cellular radio
- FEC protection; up to 2 error symbols can be accommodated in each burst
- significant level of front end RF selectivity at the RSS diplexer and similarly for the base station; the RSS bandwidth is approximately 100 MHz

Generally, the propagation environment as compared with cellular radio is far more benign, and much simpler coding can be used and the processing delay is relatively very short. Nevertheless the overall RF design budget for Proximity-I features significantly higher margins of safety as compared to cellular. Additionally the quality of the subscriber installation is assured by the easily-used Signal Assessment Kit.

ATTACHMENT 4

4.0 PROGRAM OF RESEARCH AND EXPERIMENTATION

Mountain Telecommunications Inc. (MTI) seeks Radio Station Authorizations under Part 5 of FCC Rules - Experimental Radio Service - for the purpose of conducting a pilot deployment of the Nortel Proximity I Fixed Wireless Access system on the Salt River Pima Maricopa Indian Community (SRPMIC) reservation near Scottsdale, AZ.

MTI specifically references the following types of operations (per section 5.202 of FCC rules governing the Experimental Radio Service) as being applicable:

(i) *Development of radio technique, equipment, operational data or engineering data related to an existing or proposed radio service.*

(ii) *Limited market studies*

(iii) *Other types of experiments that are not specifically covered under paragraphs (a) through (j) of this section*

MTI intend to operate the system under conditions approximating those that would exist in full-scale commercial deployments of the system, in order to evaluate its technical and operational viability and its ability to satisfy the telecommunications service requirements of SRPMIC members.

For this pilot deployment, MTI is planning to deploy and operate up to three Proximity I base stations on the reservation. These base stations will interface directly to MTI's existing DMS-500 local exchange and support up to 150 live (non-commercial) subscribers, of which 65 are presently un-served and would be receiving telephone service for the first time.

The trial subscribers would utilize a range of standard telephone apparatus (DTMF telephones, cordless telephones, FAX machines, answering machines and voiceband data modems) and have access to the full set of data and telephony services provided by the DMS-500 and supported by the Proximity I system. This includes local voice telephony, CLASS services, FAX and data services, Internet access, intra- and inter-LATA toll, operator services and 911 emergency services.

The trial subscribers would have the Proximity I RSS installed at their premises and be expected to provide feedback to MTI and the equipment vendor (Nortel), on the performance and overall acceptability (aesthetics, ease of use, service benefits) of the system and the services provided. This feedback data would then be used to optimize the operational, performance and deployment characteristics of the system and prepare MTI for future commercial deployment.

As the Proximity I base stations and subscriber terminals will be radiating and receiving RF signals in the 3.4-3.5 Ghz band, MTI understands that the system may be susceptible to interface from, and have the potential to interfere with, other systems operating in this band. As part of the research and experimentation to be carried out under this experimental authorization, MTI will assist Nortel in collecting data on the nature of any interference observed and its effect on the performance of the Proximity I system.

It is our understanding that Nortel has been working with the NTIA, DoD and Joint Spectrum Centre (JSC) on technical characterization of the Proximity I to determine whether this system can coexist with other systems in this band and what the coordination rules would need to be. MTI fully supports this activity and by conducting this pilot deployment, believes it can demonstrate the economic and social benefits available to SRPMIC members through shared access to the 3.4 – 3.5 GHz band.

5.0 OBJECTIVES

A summary of the objectives of this program of research and experimentation then follows:

Mountain Telecommunications Inc. Objectives

- demonstrate economic and social benefits of Fixed Wireless technology
- evaluate customer acceptance of services provided
- demonstrate progress towards becoming facilities-based CLEC
- evaluate system performance in a real network environment
- investigate service, application and business opportunities
- develop staff knowledge on technology and associated functions/processes
- develop plans for product standardization, market introduction and deployment
- address regulatory aspects of wireless technologies

Nortel Objectives

- support regulatory and spectrum initiatives, including DoD/JSC technical project
- characterize system performance in US network and propagation environment
- confirm performance within operator's environment
- develop application and economic/business case scenarios
- identify and resolve product deployment issues
- address operational support and operations process issues

6.0 CONTRIBUTION TO RADIO ART

This program of research and experimentation will enable MTI, Nortel and the industry to evaluate and observe the application of wireless technology in providing wirelineequivalent telephony services and the associated economic and social benefits. Fixed Wireless systems such as Proximity I can be enablers for the provision of urban services to under-served rural areas and true facilities-based competition, given the availability of suitable spectrum.

This activity will also serve to demonstrate that commercial applications can coexist with existing government or military applications in the same spectrum and that sharing arrangements are technically feasible and should be encouraged.

Based on the track record of the Proximity I system (50,000+ subscribers in service in 15+ countries), MTI and Nortel are extremely confident in its ability to successfully test and ultimately deploy this system in its service area in Arizona.

John Cespedes input (for reference):

I would like to start by explaining who Mountain Telecommunications, Inc. is and what we are about. MTI was organized in May of 1997 with a primary objective of providing telecommunications services to the Salt River Pima Maricopa Indian Community (SRPMIC) in Arizona, as well as other rural residential customers. SRPMIC has approximately 65 members without telephone service. These customers individually requested service from US West and were informed that special construction charges would be applied to the service in the amount of $3,000 per home. We (MTI) have not seen any of the information given to the members from US West this information was given verbally.

For these customers we plan to use Proximity I for servicing their telecommunications needs. Financially the Proximity will cost approximately 1/5 of the cost of a traditional copper build for these homes. We currently have a DMS 500 commissioned and processing calls. Our tower will be erected in the January - February time frame of '98.

Likewise, in the state of Arizona the Corporation Commission has identified 15 geographic areas that currently are without a service provider. We at MTI see Proximity I as the key to service in these areas.

Along with the rural applications we have for the Proximity I, we are also developing a marketing strategy for Phoenix. We see the ability to turn up a "second line" quickly as a major marketing advantage to MTI. Likewise, ISDN has been difficult to provision for the incumbent LEC, so MTI, with the use of Proximity I, would have the ability to turn-up ISDN circuits in a matter of days. This is a great advantage with the added interest in tele-commuting and high speed access to the internet.

Thank you for the opportunity to present our plans for the Proximity product and I look forward to your continued updates.

EXHIBIT 5 - ELEVATIONS

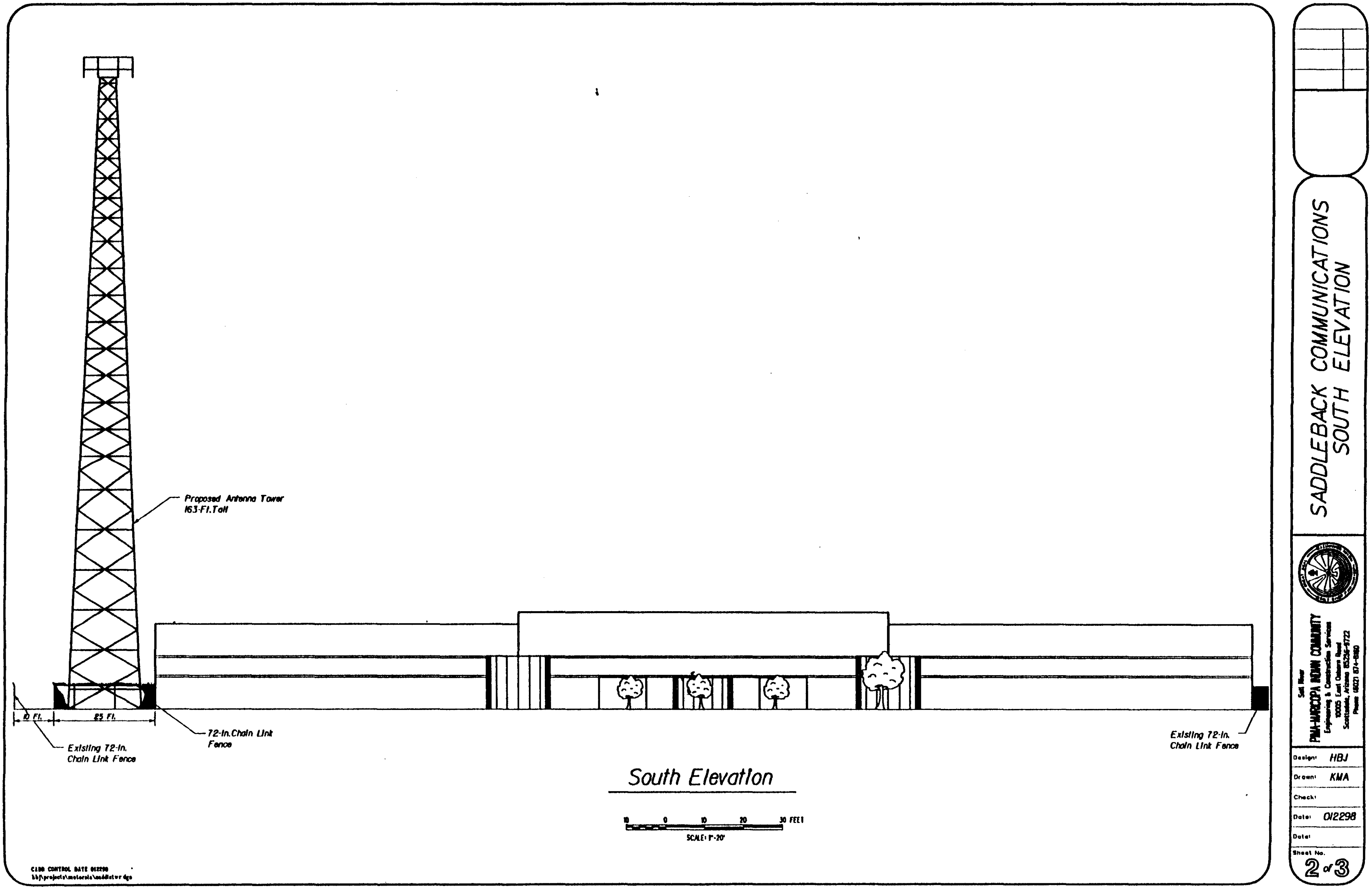

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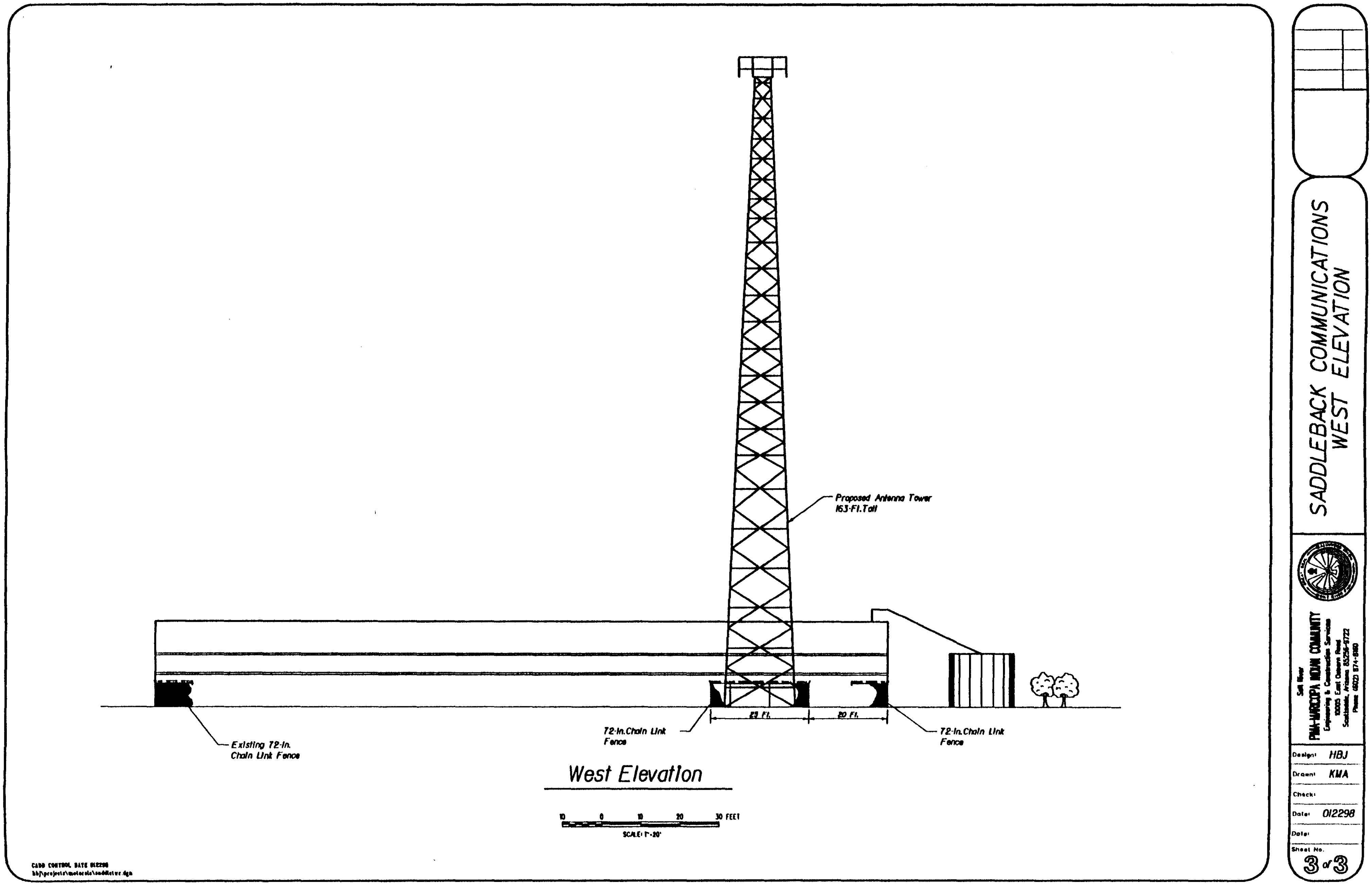
EXHIBIT 5- ELEVATIONS



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