

# WNP Communications, Inc.

## Technical Challenges to LMDS Implementation

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# WNP Communications, Inc.

## What Does WNP Stand For?

Must Truth be Boring?:

WNP = Wireless Network Provider

Size Does Matter:

WNP = Wide Network Pipe?

Tom Jones, President & CEO:

WNP = What's New Pussycat?

Spelling Challenged Techies:

WNP = What, Not Phiber?

Inside the Beltway:

WNP = Will Newt Prosecute?

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## LMDS FCC Licensing History Highlights

- Jan. '91 CellularVision licensed in NYPMSA
- Jan. '93 1st NPRM - LMDS proposed - conflicts with Satellite interests
- Feb. '94 2nd NPRM - 28 GHz Negotiated Rulemaking Committee
- July '96 1st R&O - 31 GHz, LEC and Cable restrictions proposed
- Mar. '97 2nd R&O - Service Rules adopted - LMDS ready for auction
- July '97 Public Notice - LMDS Auction to Begin Dec. 10, 1997

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## LMDS FCC Licensing History Highlights

- Sept. '97 2nd Order on Recon - Installment payments eliminated, credits increased
- Nov. '97 Public Notice - Auction postponed to Feb. '98 to “access capital”
- Feb. '98 LMDS auction commences
- Mar. '98 LMDS auction ends
- June '98 First auctioned LMDS licenses granted
- Aug. '98 Licenses granted to 81 of 104 winning bidders

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## Co-primary Allocation with MSS Feeder Links in 29.1 - 29.25 GHz Band - Iridium, Odyssey

### **LMDS Transmitter Power Limitations**

Point-to-Point - EIRP density per carrier of 23 dBW/MHz in Clear Air

Can be Exceeded with Adaptive Power Control Techniques

Hub to Subscriber - Aggregate EIRP Spectral Area Density Limit

Azimuth and Elevation Angle Restrictions

Limits by Climate Zone

No Subscriber Transmissions

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## Co-primary Allocation with MSS Feeder Links in 29.1 - 29.25 GHz Band - Iridium, Odyssey

### **LMDS Must Accept Interference**

Within 75 nautical miles of Feeder Link Complexes

None in Top 8 MSAs

2 in MSAs 9 - 25 including Phoenix

2 in MSAs 26 - 50

3 in MSAs 51 -100 including Honolulu

3 at Least 75 miles outside Top 100 MSAs

In Future at Least 75 miles outside Top 100 MSAs

Motorola Iridium

Phoenix, KC, Raleigh, Honolulu, San Juan, Spokane, Tallahassee, San Luis  
Obispo, Burlington, Bangor

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## Spectrum Sharing in the 31.0 - 31.3 GHz Band

86 Licensed Incumbents - 59 - LTTS, 19 - Traffic Control, 8 - Private

LTTS - Existing Operations Secondary Status Unchanged, No New Operations

31.0 - 31.075, 31.225 - 31.3 GHz Band (B-Block LMDS Frequencies)

Non-LTTS Incumbents Entitled to Interference Protection from LMDS

Must Protect LMDS from Interference

FCC - "does require both sets of licensees to negotiate"

31.075 - 31.225 GHz (part of A-Block LMDS Frequencies)

All Incumbents Secondary Status - Not Protected from LMDS, Must Protect LMDS

Non-LTTS Incumbents Allowed to Move to Outer Bands to Receive Protection

Applications Filed by June 26, 1998

Incumbents Limited to Terms of Existing Licenses - No Expansion, Can Renew

No New Applications

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## LMDS Auction Results

128 Rounds from February 18, 1998 to March 25, 1998

379 of 493 A-Block Licenses Won - FCC Kept 114 Licenses

485 of 493 B-Block Licenses Won - FCC Kept 8 Licenses

FCC Minimum Bids Tiered on Market Size from \$2.25/pop to \$0.50/pop

Net Bids After Credits = \$578,663,029

45% for Very Small Business = Revenue < \$15 million

35% for Small Business = Revenue < \$40 million

25% for Entrepreneur = Revenue < \$75 million

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## Top LMDS Licensees by Net Bids

	1998				
	% Total 1990		Net Bid	ChannelPops	
<u>Winner</u>	<u>A Lic.</u>	<u>B Lic.</u>	<u>ChannelPops</u>	<u>(millions)</u>	<u>(millions)</u>
WNP	39	1	37	\$186.9	1150
Nextband	13	29	15	\$134.7	461
WinStar	9	6	6	\$43.4	192
Baker Creek	15	217	6	\$25.6	143
Cortelyou	15	0	4	\$25.2	127

Note: ChannelPop = Population of licensed area times number of 100 MHz "channels"

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## The Video Heritage of LMDS

Originally Competition to Cable TV

CellularVision's experimental activities began in 1986

Licensed for New York PMSA in 1991

Instrumental in Huge Bandwidth Allocation for LMDS

### The World Has Changed

Direct Broadcast Satellite (DBS) - Changed Competitive Landscape

Internet - Changed Everything

Nature of Video Changing - MPEG2, Web vs Channel Surfing

Highest and Best Use of Broadband Spectrum - Voice, Data, Video

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## The Broadband Opportunity

Demand for Bandwidth Exploding at an Unprecedented Rate

Internet Traffic Growing 1000% Annually

Ecommerce, VPNs, Corporate Intranets

Businesses Require Bandwidth to Remain Competitive

95% of Businesses Do Not Have Access to Fiber

Expansion of LMDS Services to Residences/SOHO but Foliage Limitations

Analogy to Computing

Processing Speeds Increase, Costs Decrease

More and More Applications For Processors

Economic Incentive Created to Increase Processing Speeds, Decrease Costs

LMDS Provides Voice, Data and Video applications at speeds previously only achievable on fiber, at a fraction of the cost of fiber.

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## Competing Technologies

Fiber - Backbone Technology, Expensive “Last Mile” Deployment

xDSL - Internet Access for Residences/Small Businesses, Distance Limitations

Cable Modems - Internet Access for Residences, Limited Business Access

Satellites - Future Competitive Threat

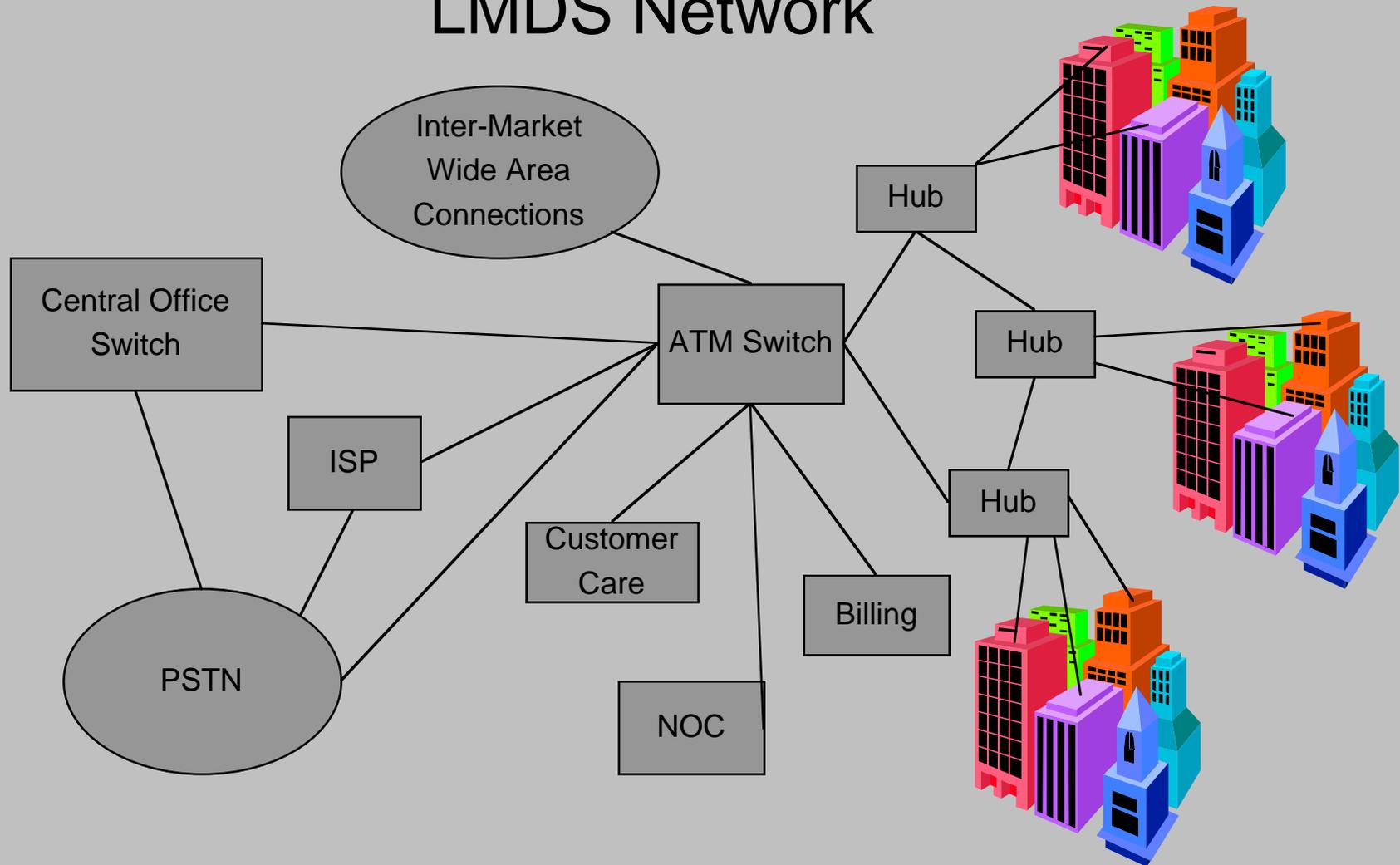
- Iridium - Limited Bandwidth

- Teledesic - Hundreds of Birds to Launch

- DirectPC - POTS Upstream

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## LMDS Network



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## Circuit Switching vs. Packet Switching

### CLEC Model

\$100 Billion Circuit Switched Voice Traffic Market

Invest in Class 5 Central Office Switches

Grow into Data Market

### Data Network

Recognize Explosive Growth of Data Traffic

Invest in ATM Switches - IP Routers

Believe Voice Traffic Becomes an Application on Data Networks

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## Hub Sites

### Point-to-Point

- ↑ Proven Reliability
- ↑ OC-3 Capacity to Single Location
- ↑ Interconnect Hub Sites - In-band Microwave Rings
- ↑ Higher Gain Antenna - Improved Range
- ↓ Too Many Antennas
- ↓ Can't spread Infrastructure Costs Across Many Customers

### Point-to-Multipoint

- ↑ Better Economics - Shared Infrastructure, Fewer Antennas
- ↓ Must Prove Reliability - Failures Affect Many Customers

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## Typical Point-to-Multipoint Hub Site

### **Outdoor Units (ODUs)**

1' Antenna with Integral Radio Unit

Four 90° Sectors, 45 Mbps/Radio

Downlink - TDMA, FDMA, or ATM Architecture

Uplink - TDMA or FDMA Architecture

### **Indoor Units (IDUs)**

19" Rack Mounted Chassis

Coax runs from IDUs to ODUs

OC-3c Network Interface - Locate Hub Site on Fiber or Microwave Ring

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## Customer Premises Equipment (CPE)

### **Outdoor Units (ODUs)**

1' Parabolic with Integral Radio Unit

10 to 45 Mbps/Radio

### **Indoor Units (IDUs)**

19" Rack Mounted Chassis

Interfaces - T1/T3, 10/100 Base T

Protocols - Ethernet/IP, FR, ATM, Transparent

Coax runs from IDUs to ODUs

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## Customer Premises Equipment (CPE)

### **Access to Risers**

IDU/Customer

IDU in Basement, Cat 5 Wiring to Customer

IDU in Basement, Use Existing Copper Plant in Building

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## Inter-City Long Haul

Fiber Backbone - Available Bandwidth

Qwest

Level3

IXC

Sprint

Worldcom

AT&T (Teleport)

Partnering Opportunities

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## Challenges to Service Rollout

Business Planning, Financing

Partnerships, Vendor Selection

Interconnection, Peering Agreements

State Regulatory Treatment

System Design, Site Acquisition

Construction, Operation

Marketing, Sales

Provisioning, Billing, Customer Care

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## Standards

### Existing Standards

Network Interfaces - SONET, TDM, ATM, FR, IP

CPE Interfaces - T1/T3, FR, ATM, 10/100 Base T

### RF Interface

Goal = Drive Down CPE Costs

Many Issues to Resolve

TDMA vs FDMA, TDD vs FDD, Modulations, Bandwidths, Powers, etc.

N-WEST Has Begun Standards Process

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## Standards

Channelization Of LMDS Bands

Interference/Coordination Issues at Boundaries

Potential Interference Between A-Block and B-Block in 31 GHz Band

FCC Emission Mask Insufficient to Eliminate Potential Interference

Select FDD over TDD or Allow Flexibility?

Allow for Point-to-Point and Point-to-Multipoint

Voluntary Standards - No One is Prevented From Deploying an Architecture

WNP Supports N-WEST Standards Effort