



The HighPoint Broadband Delivery System

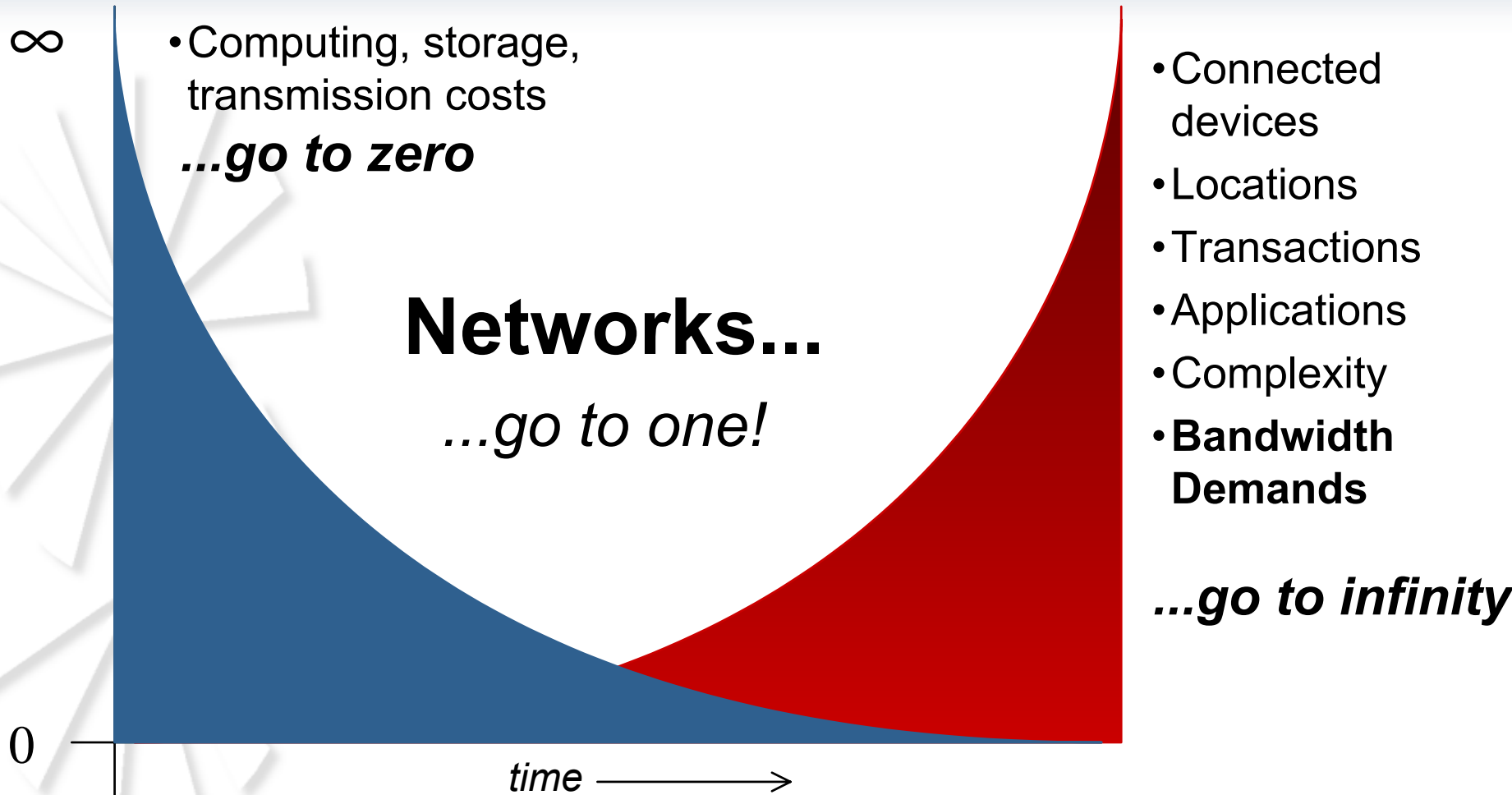
Ermanno Pietrosevoli

School on Radio Use for digital and Multimedia

Communications

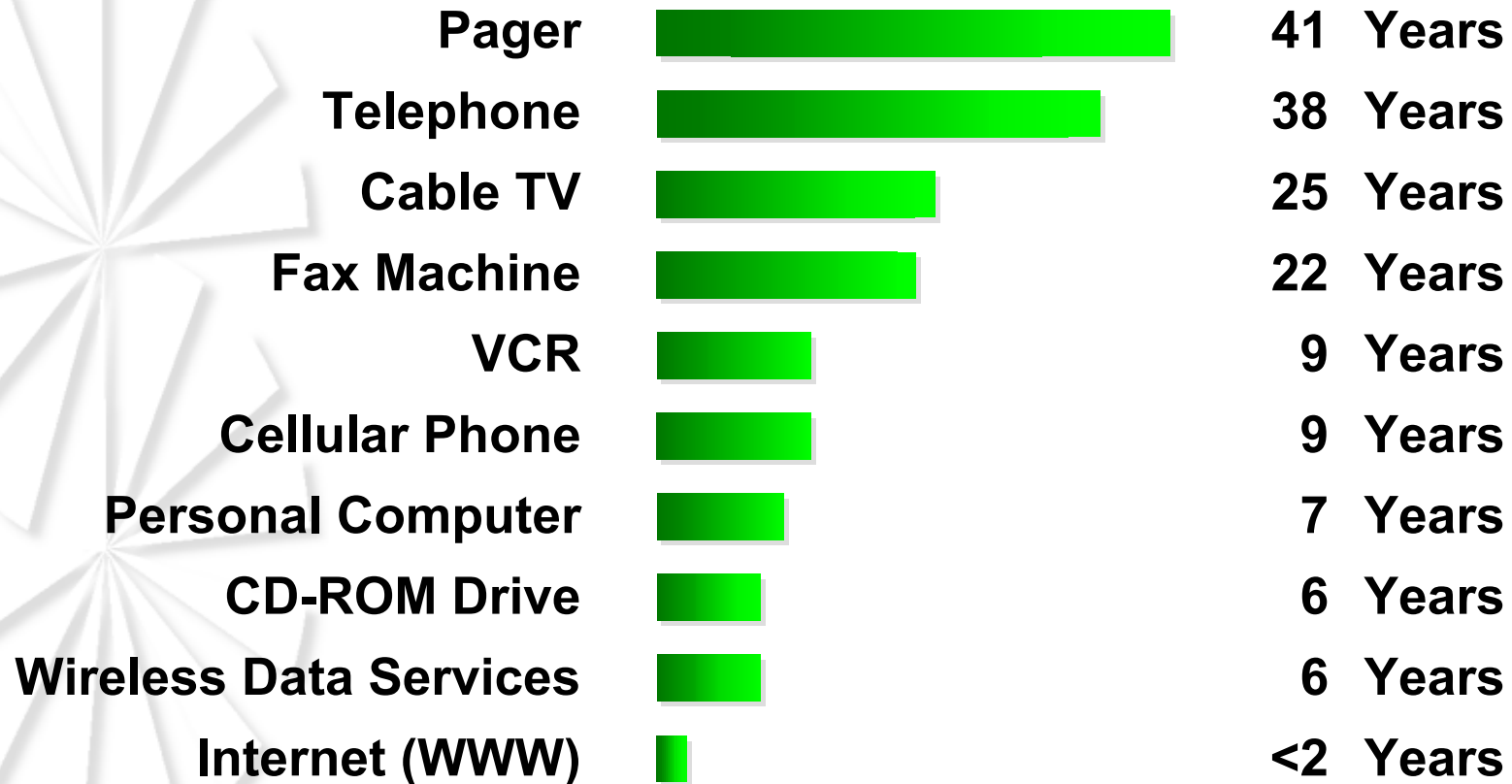
ICTP, February 2002

Economy Driving Forces



Acceleration of Change

Time it took for these technologies to reach the 10 million customer mark after being introduced to the mass market



Source: USA Today, Info Tech and Pac Tel Cellular

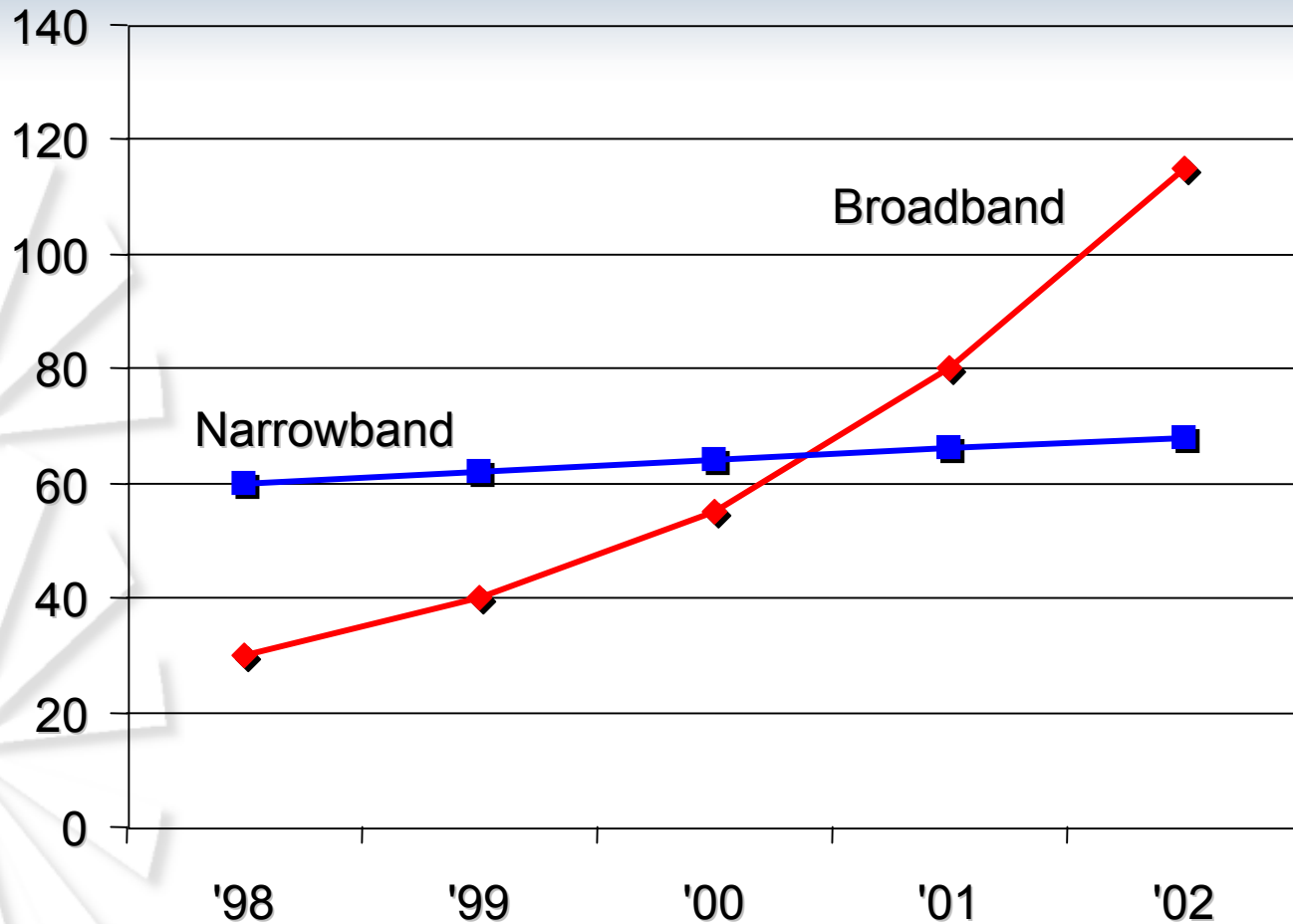
Global Deregulation & Privatization

- ❑ **Telecom privatizations lead to increased investment in modern equipment**
 - ❑ Deregulation and Liberalization of telephone companies occurring worldwide
 - ❑ State owned telcos privatizing
 - ❑ Competition being encouraged
- ❑ **Frequency Allocation**
 - ❑ Worldwide at 2.5 GHz and 3.5 GHz
 - ❑ 3.5 Emerging as International Standard
- ❑ **Meanwhile.....Demand for increased connectivity growing.....Time to Market Critical**

Huge potential for new service providers and managers of networks classically reliant on terrestrial infrastructure

- ❑ IP WAN & Internet connections in high demand
- ❑ IP Platform *now* supports multiple data, video and voice applications:
 - ❑ Internet access
 - ❑ WAN access
 - ❑ Video conferencing, Video streaming
 - ❑ IP telephony
 - ❑ Value Added Services

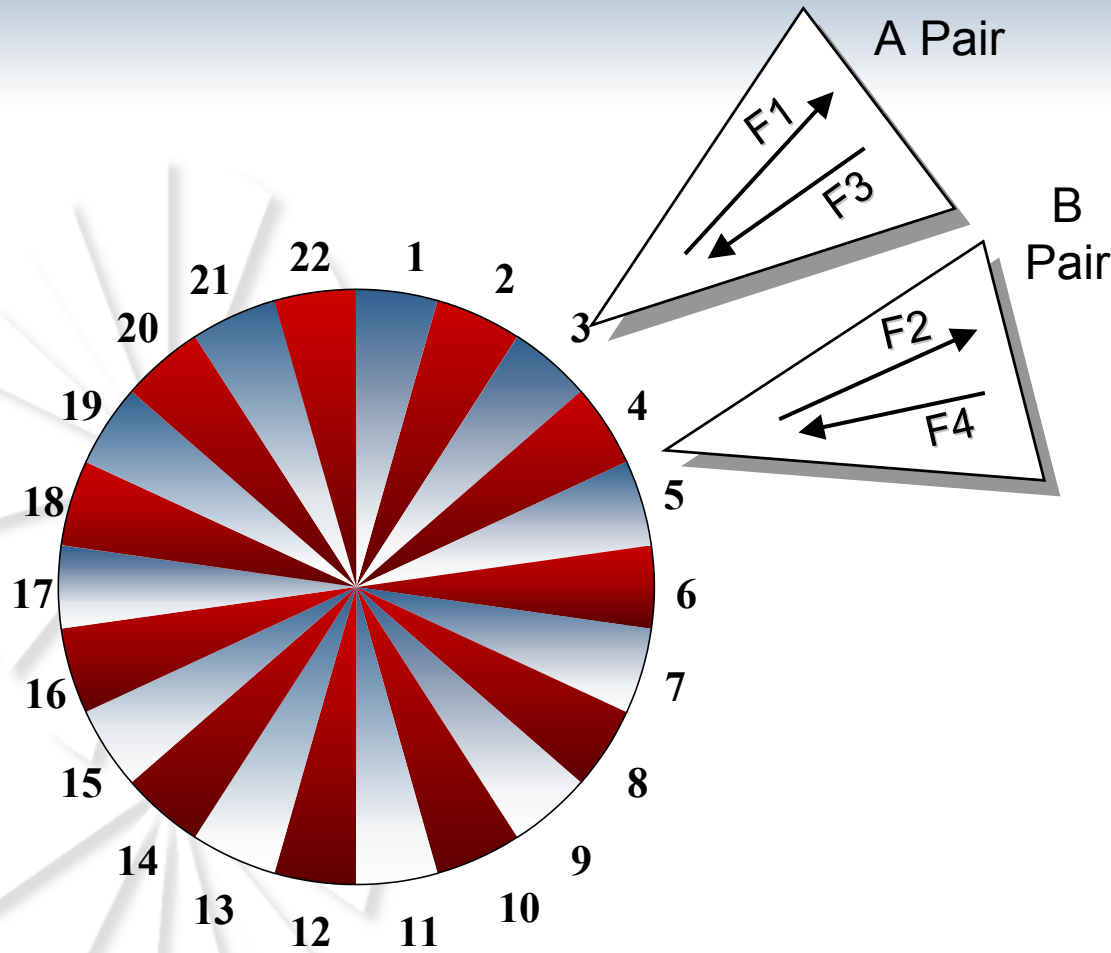
Broadband Local Access Demand (Lines in Millions)



Source: IDC, FDC, and Lehman Brothers Estimates

HighPoint™ Concentrator & S²R Technology

Patent Pending



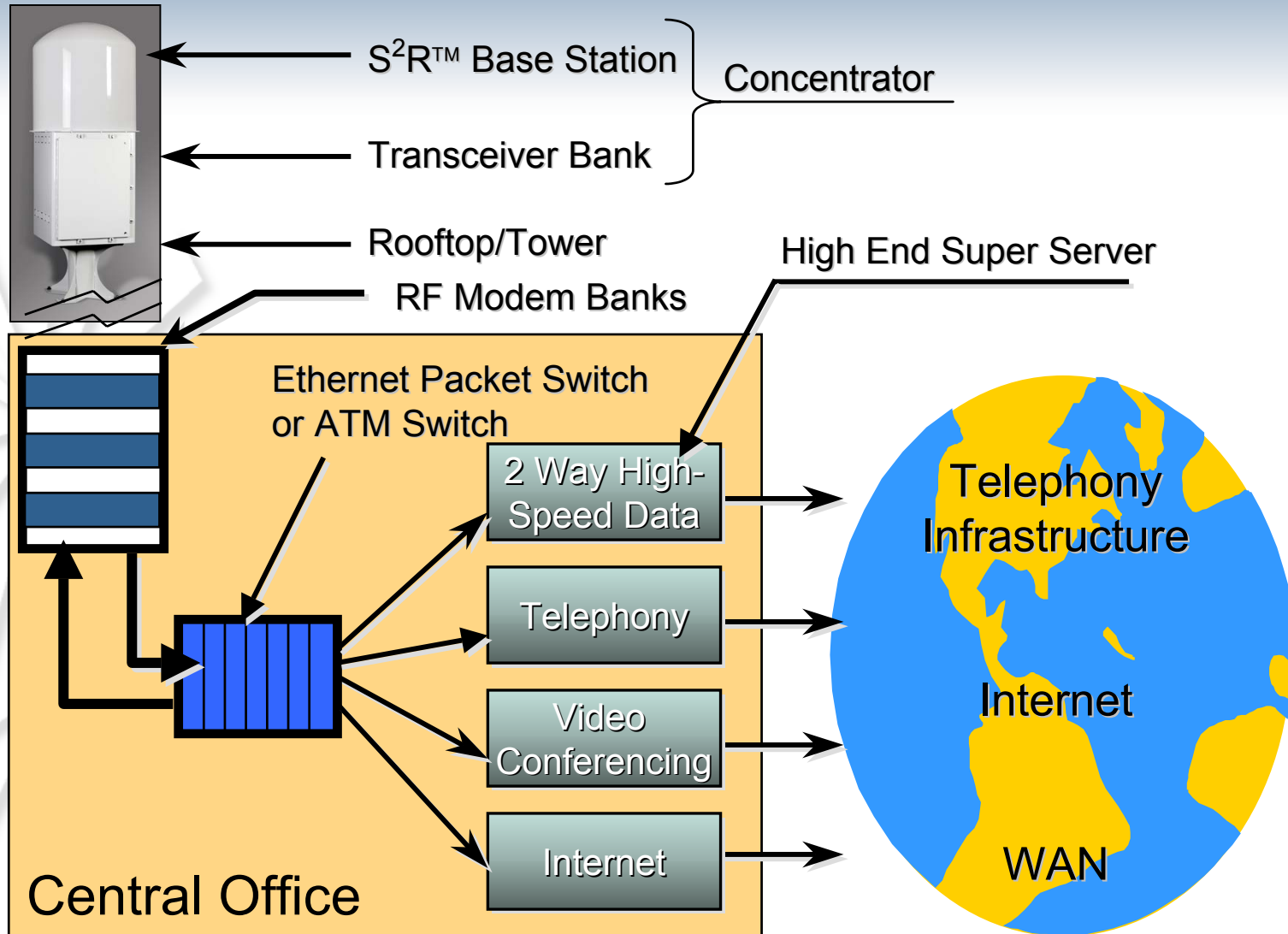
HighPoint™ Concentrator S²R™ Technology allows spectral reuse of channel pairs

Spectral reuse with S²R™ Technology results in a ratio up to 11:1 for spectral efficiency.

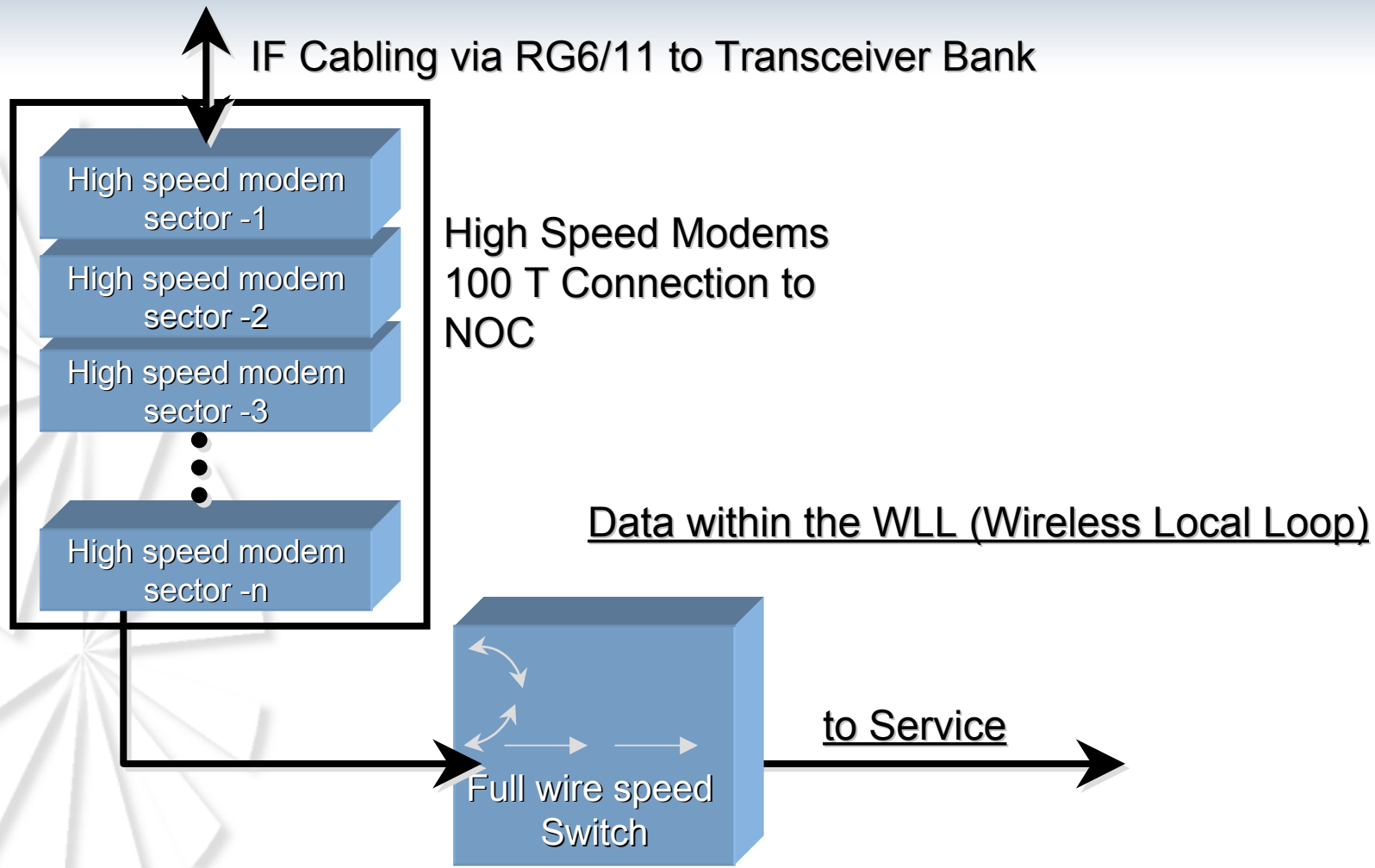
Throughput Based on Channel Size

Channel Bandwidth	Downstream Throughput	Upstream Throughput	Aggregate Throughput
3.5 MHz	12 Mbps	5.4 Mbps	382.8 Mbps
5 MHz	17 Mbps	7.6 Mbps	541.2 Mbps
6 MHz	20 Mbps	8.75 Mbps	632.5 Mbps
7 MHz	24 Mbps	10.24 Mbps	753.3 Mbps

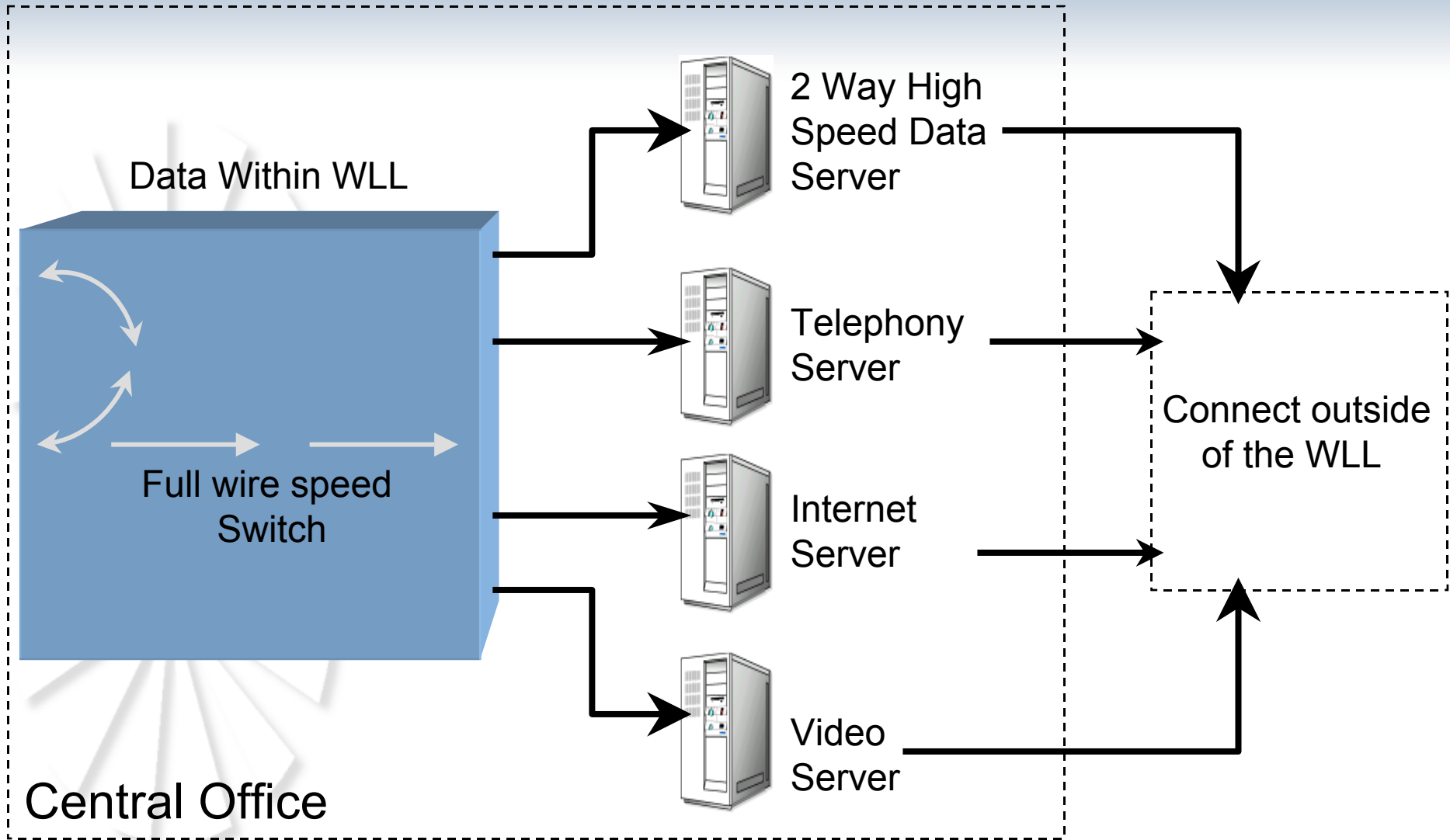
HighPoint™ Service Provider Architecture



Modems and Switch

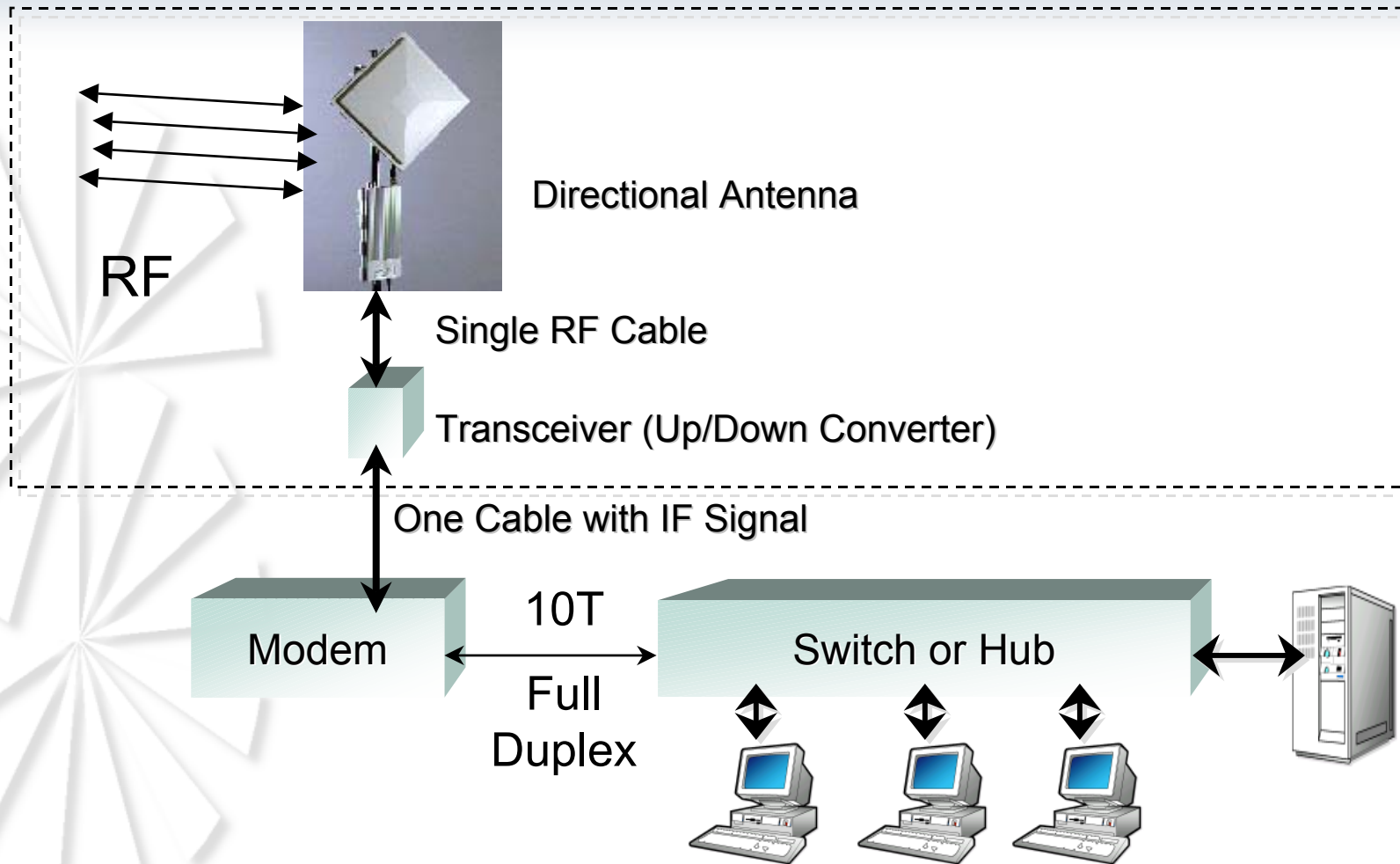


Computing Environment



HighPoint™

Subscriber Side Architecture



HighPoint BDS



wireless
concentrator
base station



aesthetically
pleasing flat panel
antenna



low profile, higher
gain mesh
parabolic antenna



subscriber radio
transceiver

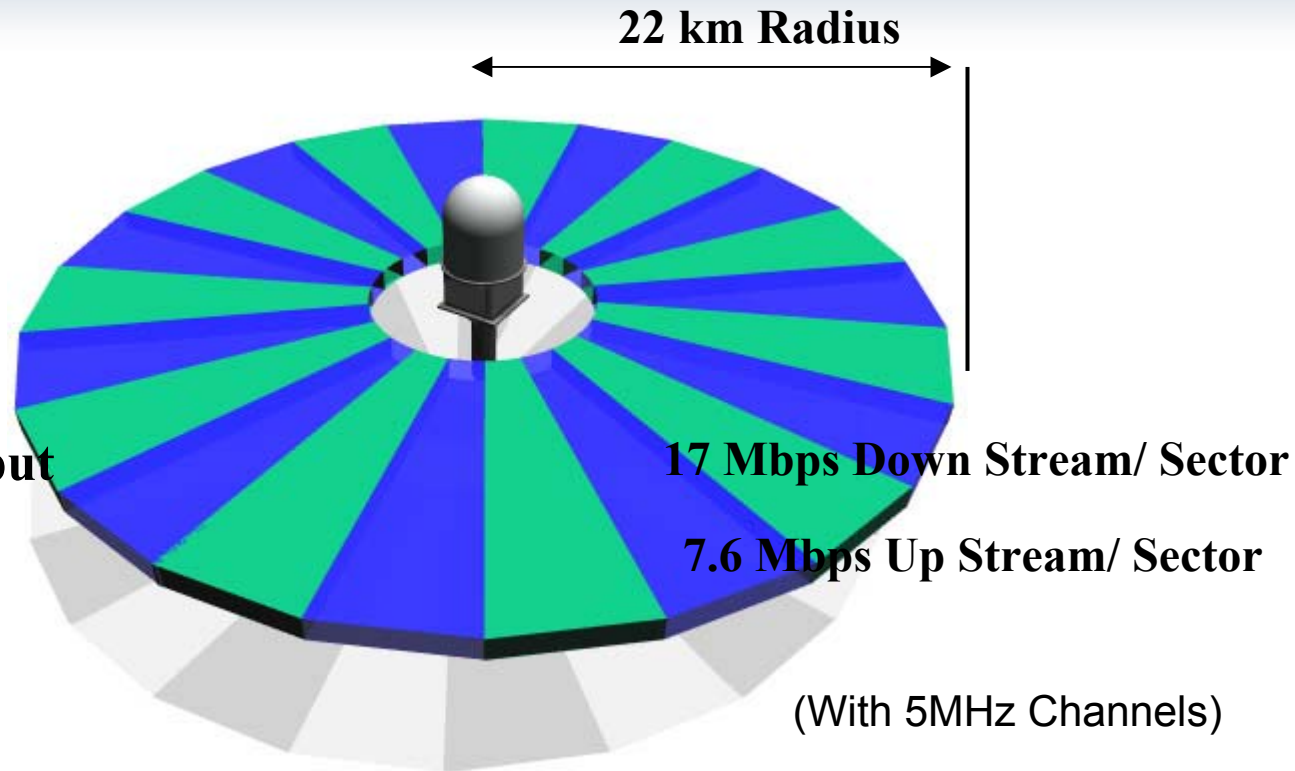
HighPoint™ SuperCell

*Max coverage
per unit cost*

**Up to 541 Mbps
Aggregate Throughput**

Benefits

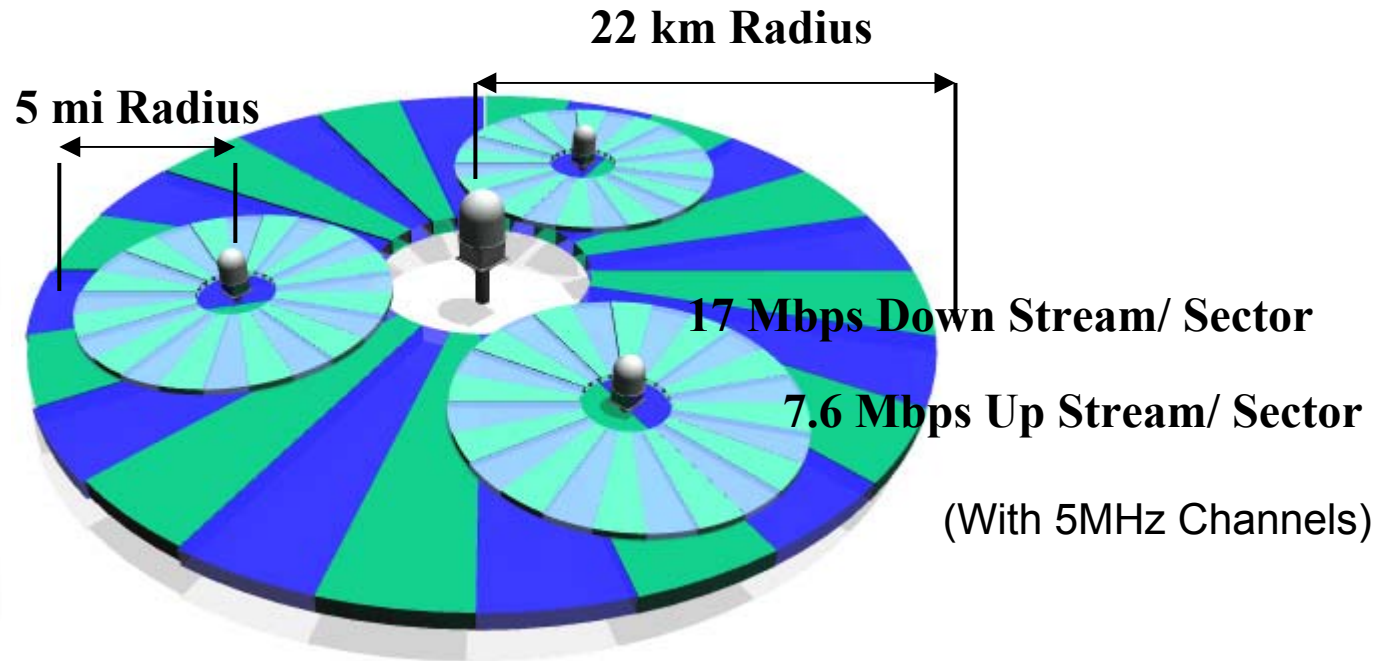
- Maximize Channel Capacity
- Inexpensive
- Simple
- Quick



HighPoint™

FocalCell

Optimal bandwidth & coverage



2.1 Gbps Aggregate Throughput

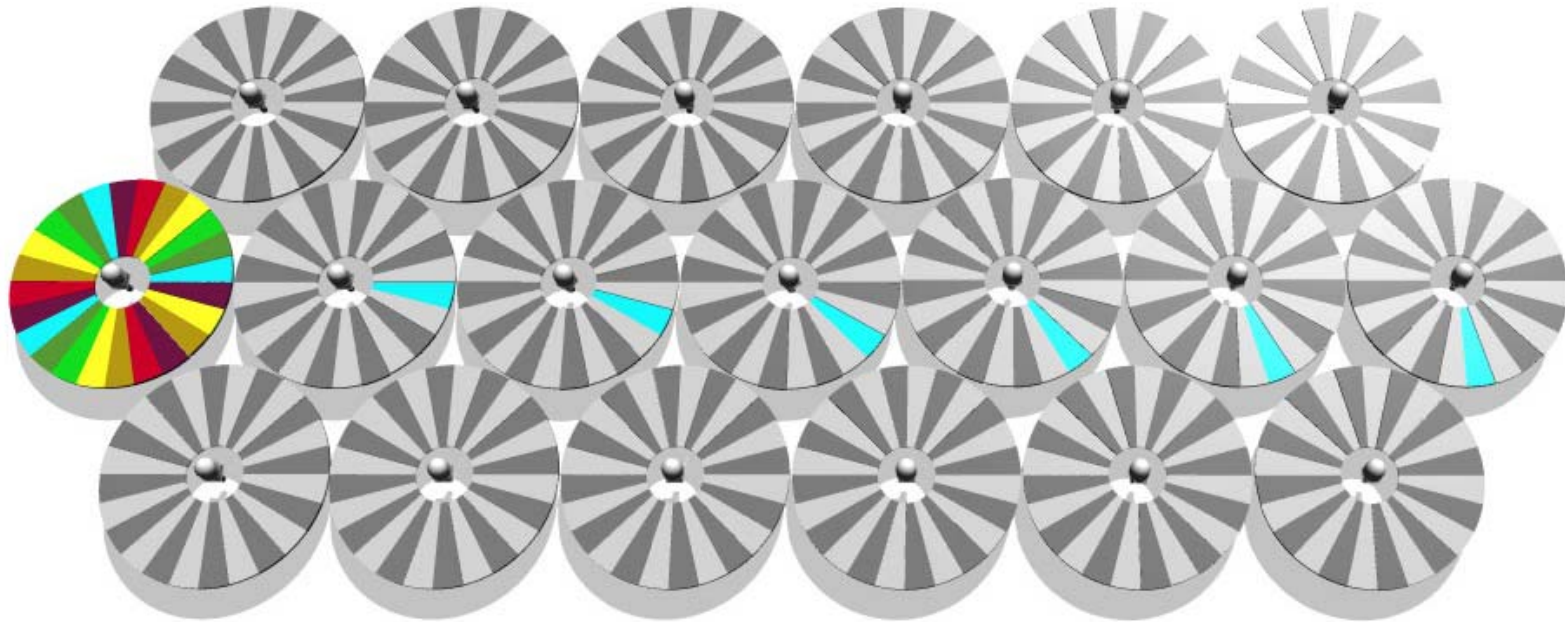
Benefits

- Time to market
- Invest for return
- Simple
- Excellent coverage
- Migration path
- Teledensity sensitive

HighPoint™

MultiCell

100% Reuse in a MultiCell Environment



Benefits

- Efficiency through Sectoral/Multicell
- Endless Possibilities
- 100% reuse in adjacent cells
- 3 to 4 times re-use in cell
- Excellent Coverage
- Highest Possible Bandwidth

478Mbps Cell Capacity (4MHz Channels)

3,346 Mbps in 7 Cell Deployment

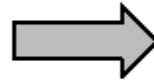
83.65Bit/Hz Spectral Efficiency

provides coverage and investment precisely tailored to the varying teledensity of subscribers in a particular area. It combines the best attributes of multi-cell and super-cell configurations. For example, in a geographic region with highly concentrated clusters of businesses or multi-dwelling units (MDUs), a focal-cell scheme enables service providers to deploy multiple cells within a single larger cell and selectively target the most lucrative segments of the market, offering cost efficiency, scalability and a clear migration path.

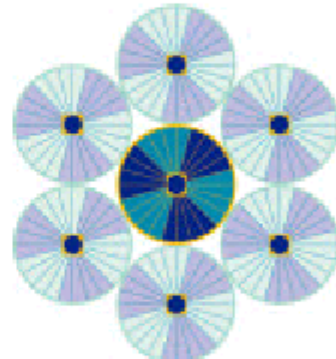
Multi-cell and Focal-cell Diagrams



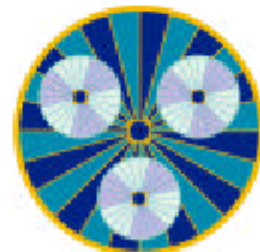
Super-cell



Super-cell



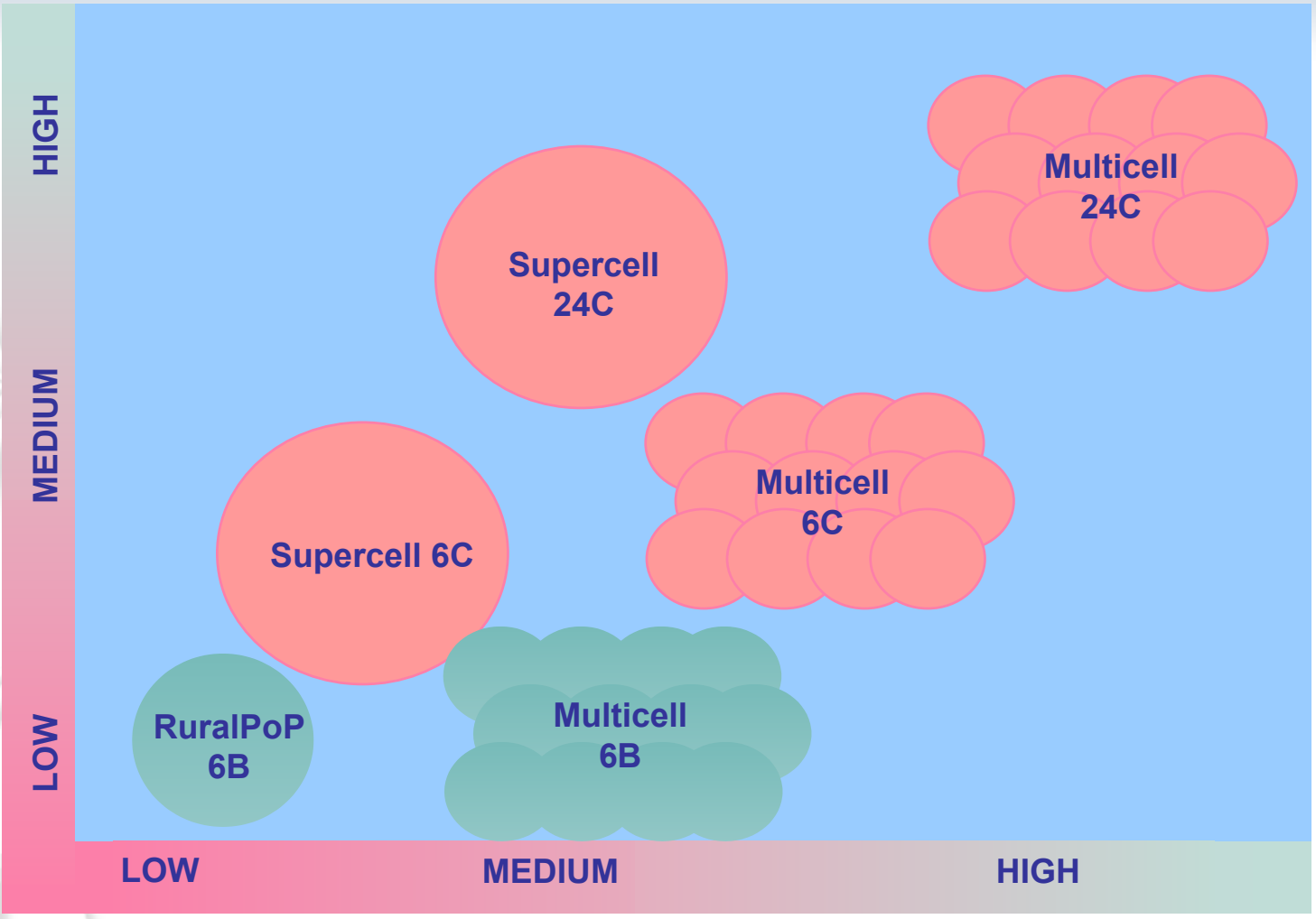
Multi-cell



Focal-cell

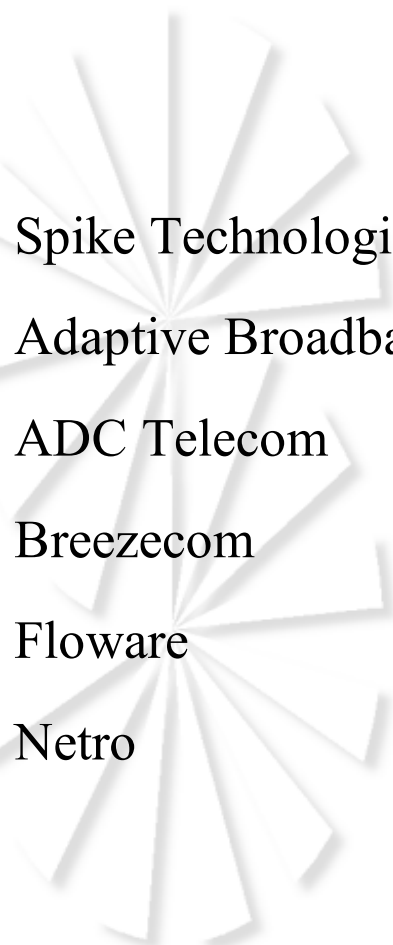
Product Solutions Positioning

Reuse / Efficiency / Throughput



Customer Density

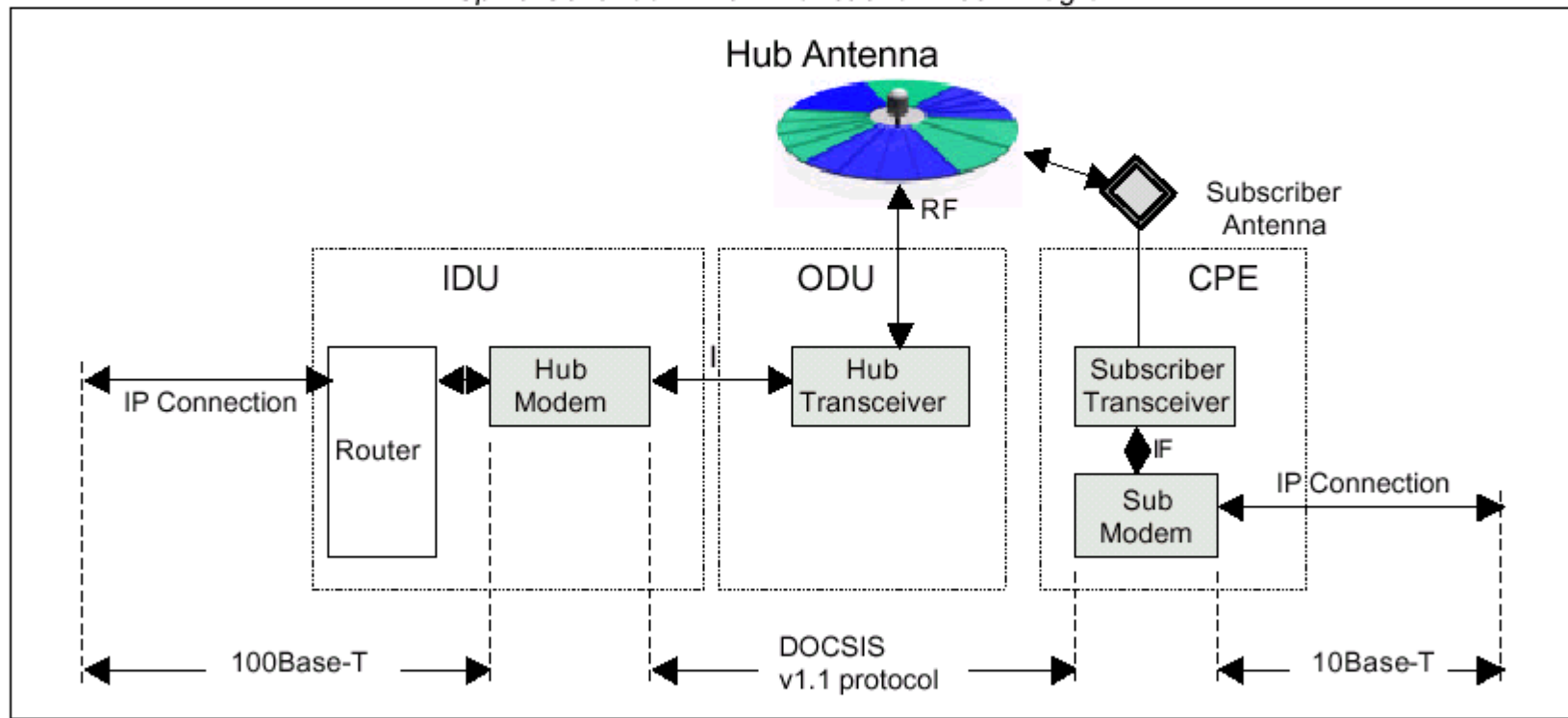
Spike Positioning



	<u>Currently Shipping MMDS Product</u>	<u>Currently Shipping FWA Product</u>	<u>Aggregate Throughput Per Cell</u>	<u>Occupied Bandwidth Per Cell</u>	<u>Bits per Hertz per Cell</u>
Spike Technologies	Yes	Yes	418 Mbps	14 MHz	29.8
Adaptive Broadband	No	No	60 Mbps	21 MHz	2.9
ADC Telecom	Yes	No	NA	NA	NA
Breezecom	No	Yes	18 Mbps	24 MHz	0.75
Floware	No	Yes	24 Mbps	14 MHz	2.5
Netro	No	No	NA	NA	NA

The figure below shows a functional block diagram illustrating system connectivity. The *Continuum278* system encompasses all equipment from hub modem Ethernet port to subscriber modem Ethernet port (shown in color or shaded below).

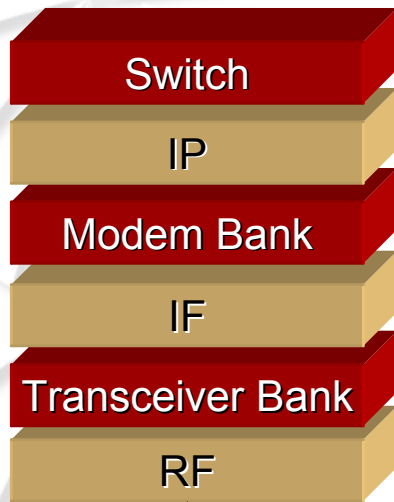
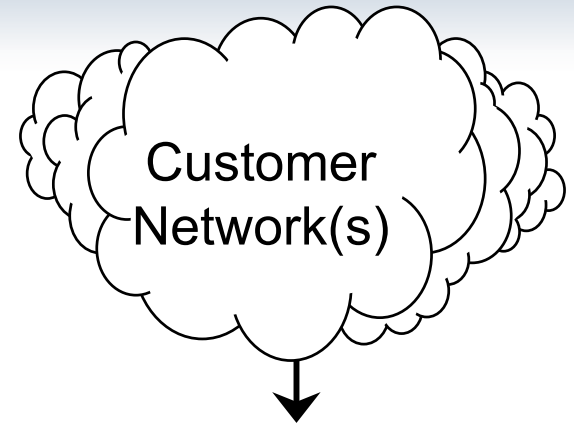
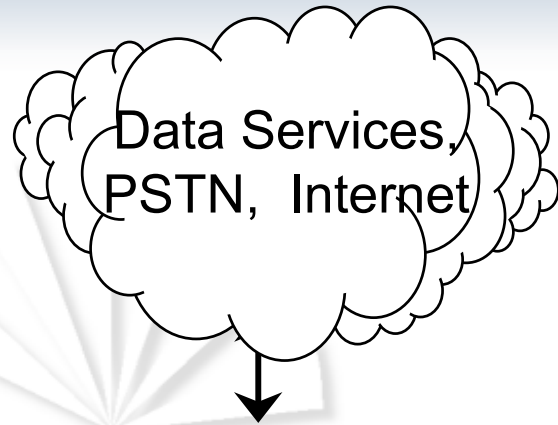
Spike Continuum278 - Functional Block Diagram



The system operates in the 2.3 to 2.7 GHz (including MMDS) or 3.4 to 3.6GHz (FWA or WLL) licensed frequency bands. The inherently robust RF

Multi-Service Architecture

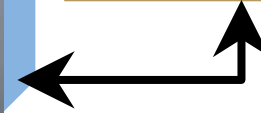
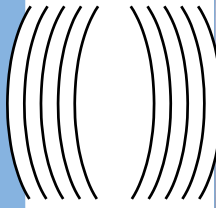
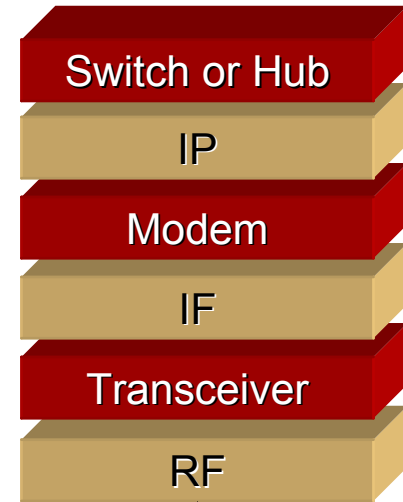
Data, Voice & Video



CO Side



Subscriber Side



Market Review

HighPoint

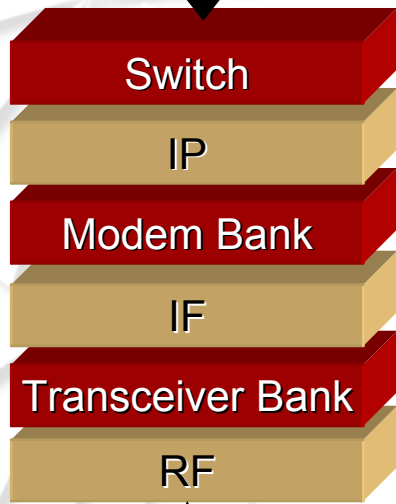
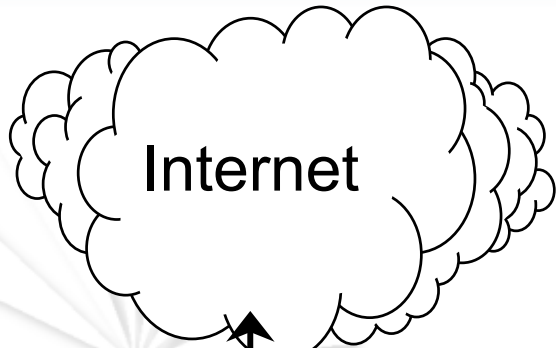
Deployment

Positioning

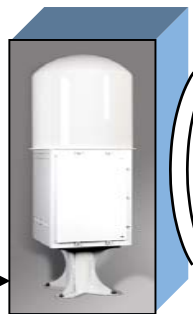
I.P. Services

Multi-Service Architecture

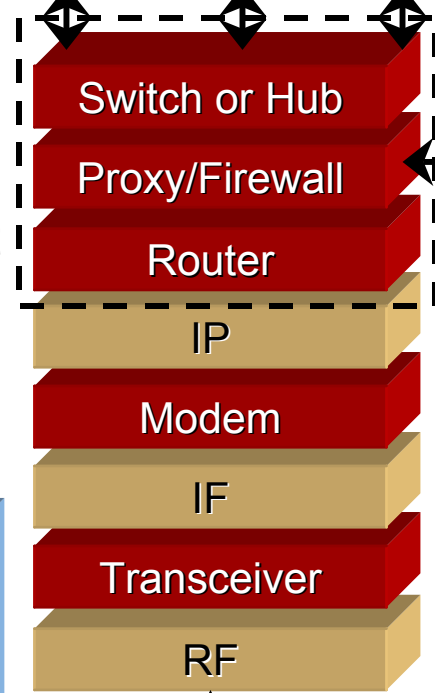
Dedicated Internet Access



CO Side



Subscriber Side



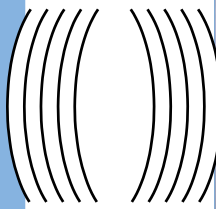
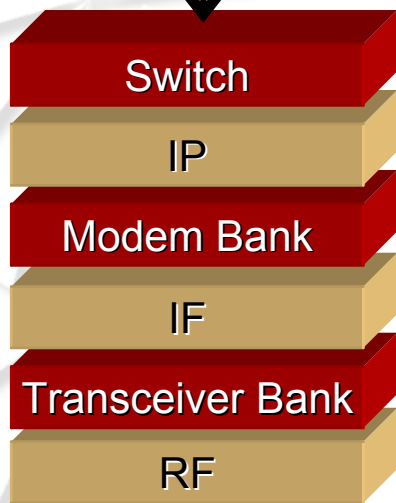
Existing
Premises
Equipment



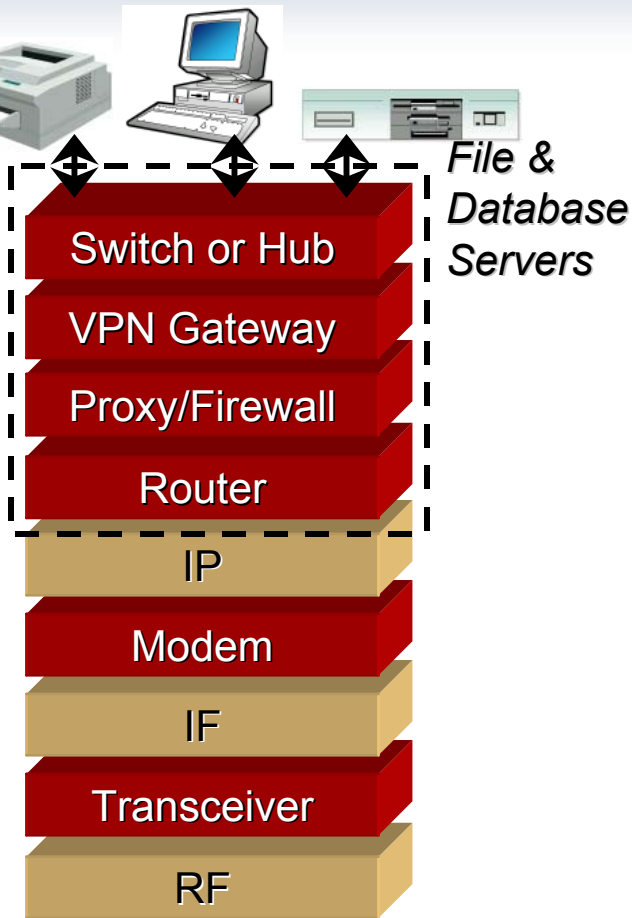
HTTP
FTP
SNMP

Multi-Service Architecture

LAN-to-LAN Connections

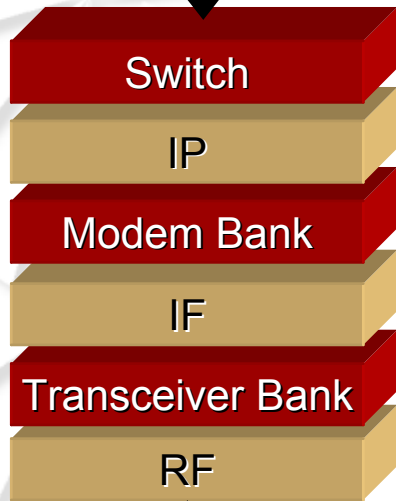


Subscriber Side

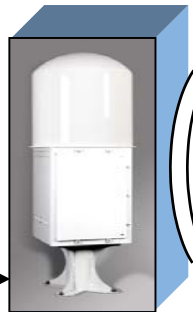


Multi-Service Architecture

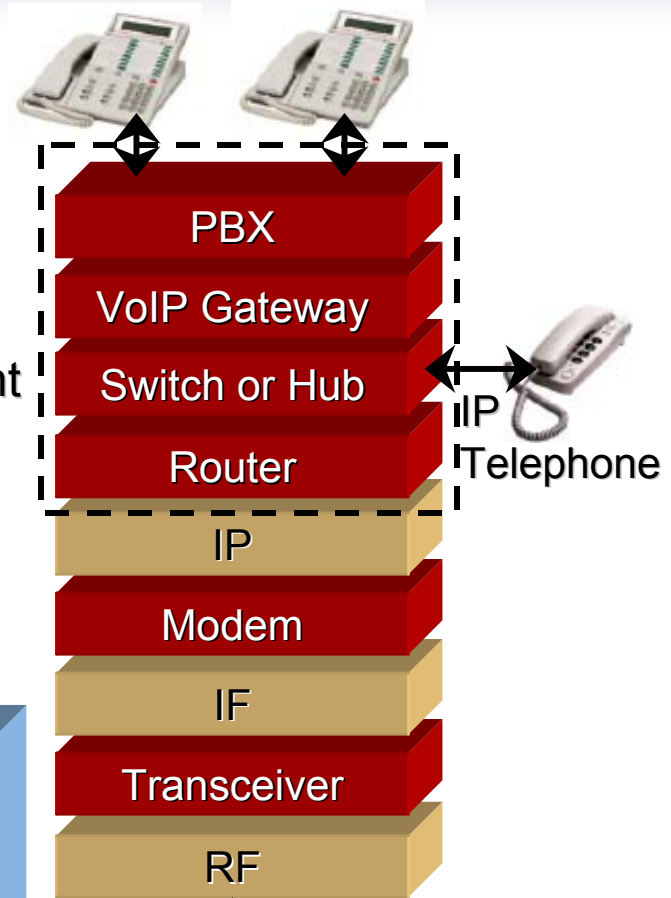
Voice-over-IP Connections



CO Side



Subscriber Side



Market Review

HighPoint

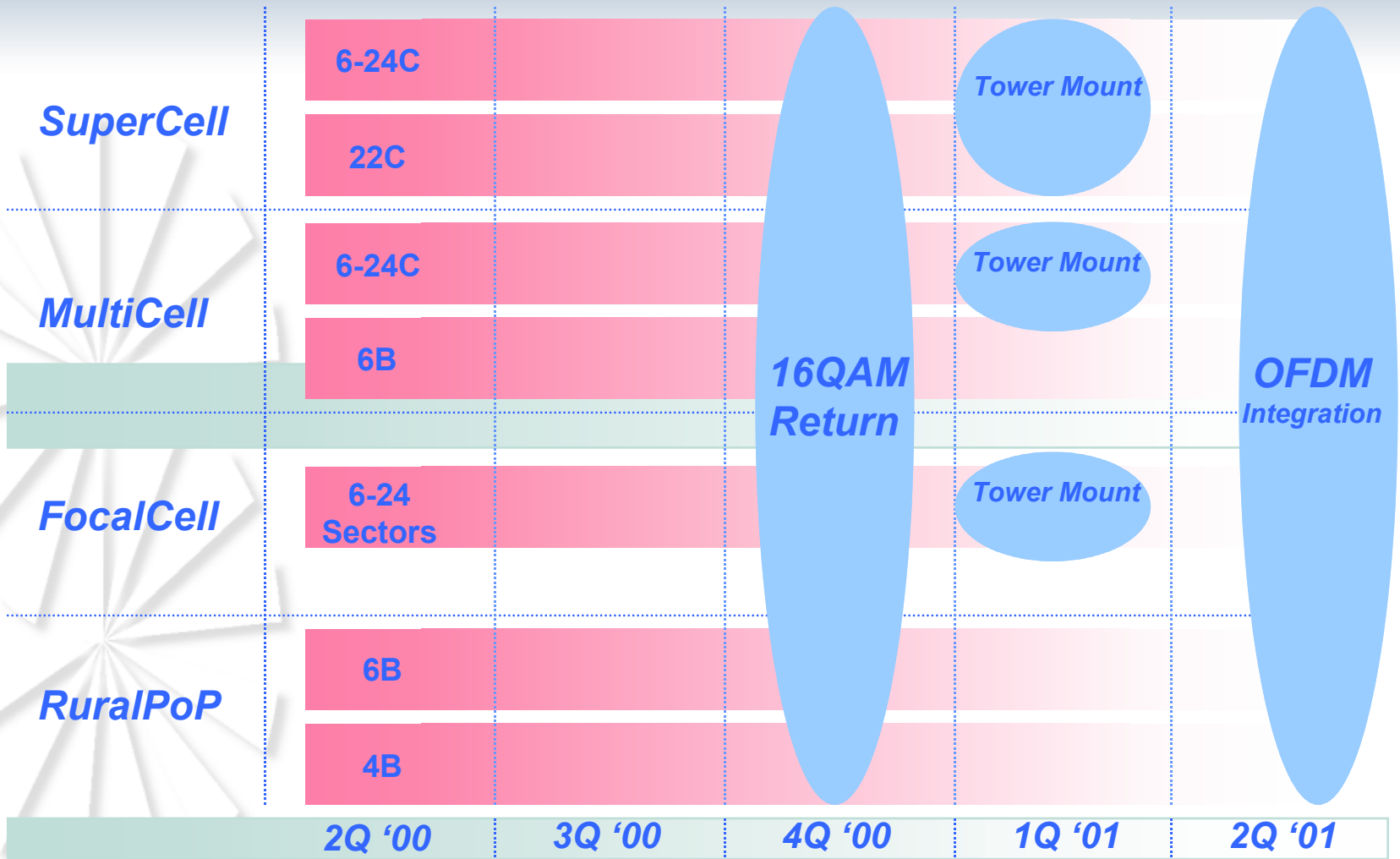
Deployment

Positioning

I.P. Services

Product Timeline

Head-End



Market Review

HighPoint

Deployment

Positioning

Future Direction

VoIP Access Solutions

for

Continuum Fixed Broadband Wireless Access Systems

Spike Broadband Systems' new suite of VoIP access products for the *Continuum70* and *Continuum278* fixed broadband wireless access systems offers telecomm carriers and service providers affordable toll-quality, packetized, IP voice solutions for their SME, SOHO, MDU and residential customers. Each product integrates seamlessly with existing Continuum system CPEs at the subscriber site.

Features

- H.323 version 2 compliant
- QoS Control
- Voice Prioritization by IEEE 802.1 Q/p
- Silence suppression
- Unique dynamic jitter buffer control
- Automatic delay recovery control
- Adjustable voice payload length
- Integrated automatic Echo Cancellation
- End to End DTMF Regeneration (H.323)
- Call supplementary services, such as call hold, transfer, call forward, call waiting, etc. (H.450 compliant)
- T.38 Real-time data flow control for facsimile transmission
- Automatic fax signal recognition
- Numbering Management: Built -in E.164 address conversion database up to 100 IP addresses or corroborating with H.323v2 compliant gatekeeper
- DHCP compliant
- Remote manageability: FTP/ TELNET

Specifications



-Numbering Management: Built-in E.164 address conversion database up to 100 IP addresses or corroborating with H.323v2 compliant gatekeeper

-DHCP compliant

-Remote manageability: FTP/ TELNET

Specifications

•User Interface

Telephone port:	1 port, FXS(Foreign Exchange Station), RJ11
Telco line port:	1 port, FXO(Foreign Exchange Office). Loop start. RJ11
PC port:	1 port, 100B-TX/10B-T, RJ45

•Network Interface

LAN port:	1 port, 100B-TX / 10B-T, RJ45
-----------	-------------------------------

•Management Interface

Maintenance port:	1 port, Serial, EIA/TIA RS-232C 9pin D-SUB
Unit configuration:	RS232C serial -Local, LAN -Remote

•Protocol

Call control:	TCP/IP, ITU-T H.323v2
Voice transmission:	UDP/IP, RTP/RTCP
Voice CODEC:	G.729a (8kbps) / G.723.1 (5.3/ 6.3kbps) / G.711
Fax transmission:	TCP/IP ITU-T T.38 real-time transmission 2.4k – 19.2kbps

•Power Requirement:

12VDC, (through external AC adapter)

•Unit size / Weight:

1.8(W) x 7.3(D) x 6.1(H) inches / Less than 1 lb.

•Regulatory Approvals (in process)

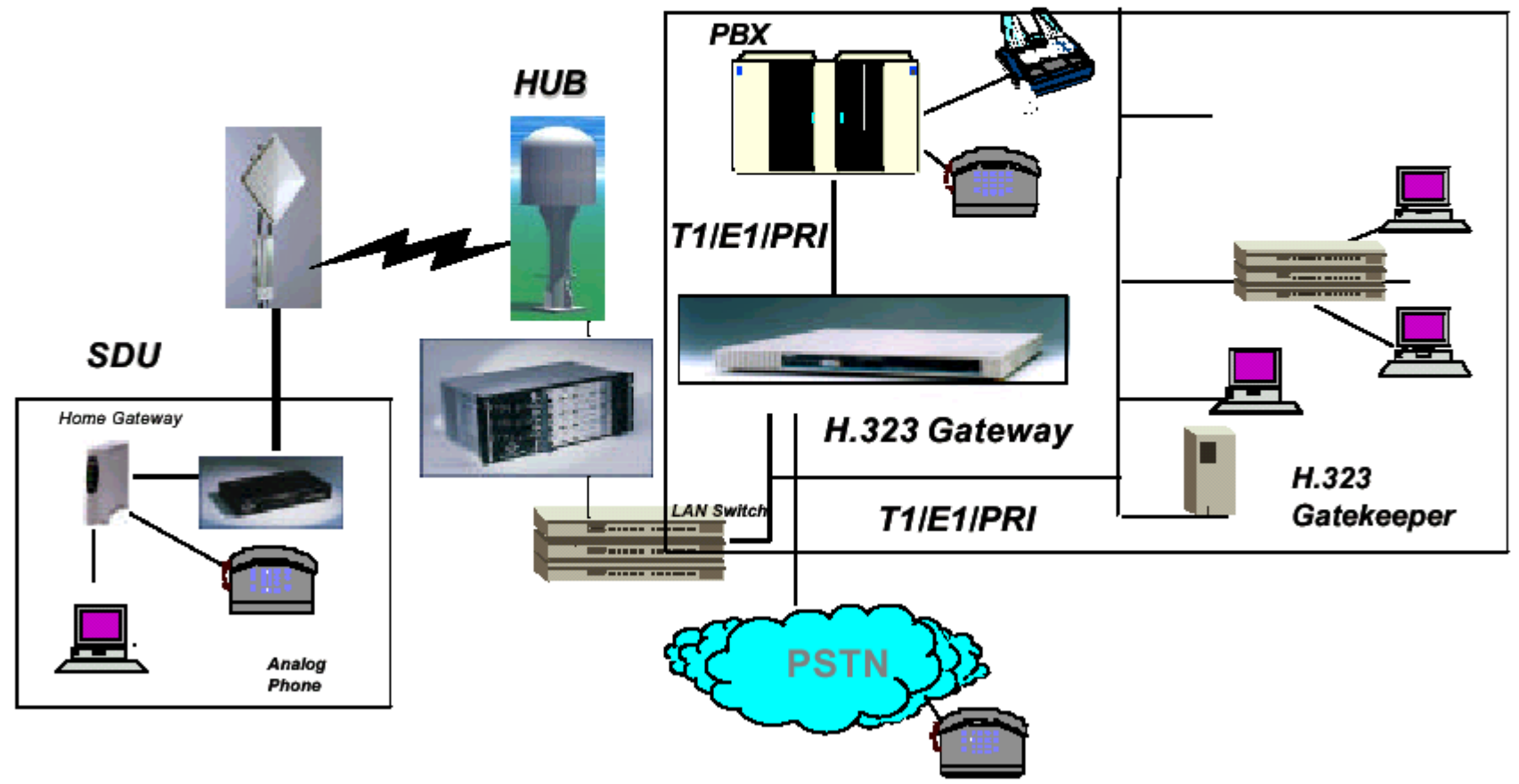
UL 1950, cUL 950, FCC Part 15 Class A, FCC Part 68, ICES-03 Class A

Spike Broadband Systems, Inc.

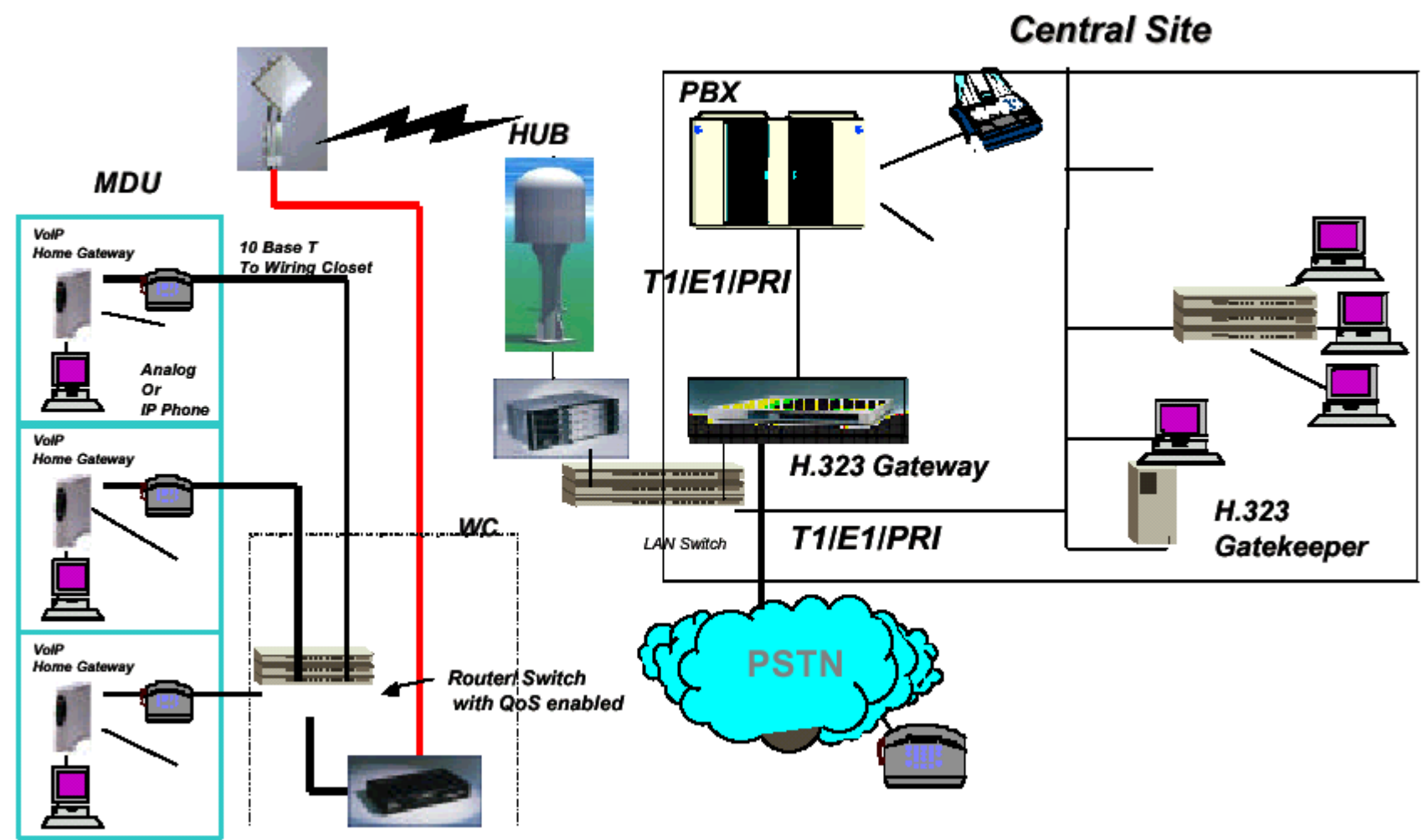
11 Pine Street Extension
Nashua, NH 03060
Main: (603) 578-7300

Typical Deployment Scenarios

I. SOHO / SDU: Voice & Data



II. MDU: Voice & Data



THANK YOU !

