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VIA ECFS

November 14, 2011

Ms. Marlene H. Dortch
Office of the Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, D.C. 20554

Re: *ORAL EX PARTE COMMUNICATION*
BridgeWave Communications, Inc.
ET Docket No. 07-113

Dear Ms. Dortch:

On November 10, 2011, Eli Pasternak, Idan Bar-Sade, Paul Obsitnik and the undersigned, all on behalf of BridgeWave Communications, Inc. ("BridgeWave"), met with Karen Ansari, Anh Wride, William Hurst and Thomas Phillips of the Commission's Office of Engineering and Technology to discuss the *Notice of Proposed Rule Making* and BridgeWave's filings in the above-referenced proceeding. In particular, BridgeWave highlighted the growing demand for picocell backhaul solutions that support 4G service, and why the unlicensed 60 GHz band is optimal for picocell deployments. BridgeWave also addressed questions regarding certain technical issues in the *Notice of Proposed Rule Making*, including signal measurement. Finally, BridgeWave clarified that its proposed EIRP-based alternative to the Commission's existing in-band power density rule (Section 15.255(b)(1)) would be limited to deployments that are entirely outdoors. Indoor users of the spectrum would be allowed to rely on the Commission's existing power density rule. A copy of BridgeWave's written presentation for the meeting is attached hereto.

Pursuant to Sections 1.1206(b)(2) and 1.49(f) of the Commission's Rules, this letter is being filed electronically with the Commission via the Electronic Comment Filing System. Should you have any questions regarding this presentation, please contact the undersigned.

Very truly yours,

/s/ Robert D. Primosch
Robert D. Primosch
Counsel for BridgeWave
Communications, Inc.

cc (via e-mail):
Karen Ansari
Anh Wride
William Hurst
Thomas Phillips

BridgeWave
COMMUNICATIONS

The 60 GHz Band

4G Backhaul Enabling the Mobile Broadband Future

ET Docket No. 07-113

November 2011

EXECUTIVE SUMMARY

- The National Broadband Plan, Recommendation 5.10: "***The FCC should revise its rules to allow for greater flexibility and cost-effectiveness in deploying wireless backhaul.***"

- Nationwide 4G service demands a high capacity, cost-efficient alternative for wireless backhaul, particularly as networks become more dependent on small cell deployments.

- Due to its high amount of bandwidth and other factors, the unlicensed 57-64 GHz (60 GHz) band is uniquely positioned to offer a high capacity, cost-efficient backhaul alternative for 4G *immediately*.

- The technical amendments proposed in the NPRM will bring the 60 GHz rules into line with current technology and eliminate ambiguities that prevent optimization of the spectrum. They will benefit large and small 60 GHz antennas alike.

- The NPRM has been pending for four and a half years, has received relatively little opposition and appears to be viewed favorably by the Commission.

BridgeWave Communications

- **4G wireless backhaul for mobile carriers and private networks.**
- **MMW focus, 60 GHz for Picocell, 80 GHz for Macrocell with 80%+ market share**
- **Started in 1999 (LMDS), restarted by founding team to pursue High Capacity backhaul in 2004**
- **~100 employees**
- **Key investors include Intel Capital, Core Capital, and Cipio Partners**

Corporate Headquarters: Santa Clara, CA

ISO 9001:2008
FM 59394

BridgeWave COMMUNICATIONS

Over 12,000 Systems Deployed

Service Providers

Time Warner Cable, at&t, Sprint (Together with Nextel), clearwire, PAETEC, towerstream, QX.net, Cox Communications, mtltelecom, MST, WiLine, airband, metronet manchester

Municipalities

City of Temple, Richmond Virginia, City of Phoenix, City of Oakland, Lancashire Constabulary, City of Newark, Dallas Police, City of Southlake

Enterprise

IBM, Anheuser-Busch, Apple, Honda, Chevron, Mercedes-Benz, Microsoft, Sony, Rambus, nVidia, Hershey's, Juniper Networks, gettyimages, Business & Scientific Services Ltd

Government

Lockheed Martin, United States Senate, USA United Space Alliance, Department of the Air Force, Department of Commerce, U.S. Army, Department of the Navy

Healthcare

Johns Hopkins Medicine, St. Jude Children's Research Hospital, Mercy (At the heart of healing), Caritas Christi Health Care, Applied Medical, Novartis, John Muir Health, Baptist Memorial Health Care, Medical X-Ray Center P.C., Peninsula Regional Medical Center, HSC Belfast Health and Social Care Trust

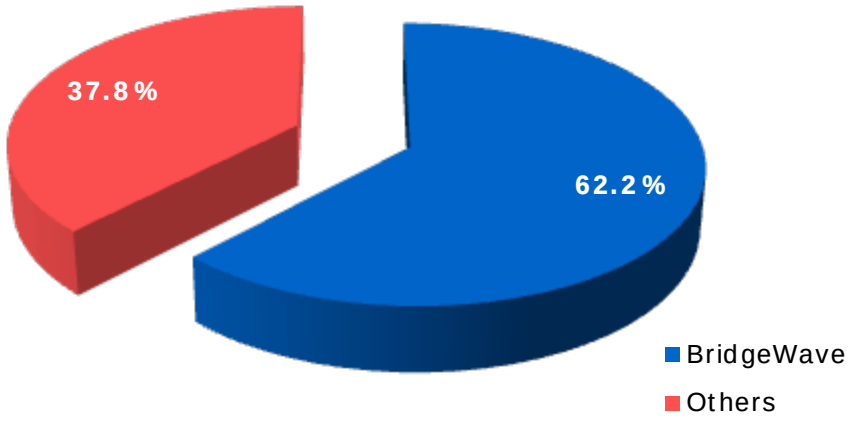
Education

Harvard, Michigan, Cornell University, University of Phoenix, Stanford, George Brown College, The University of Sydney, Seattle University

The High Capacity Market Leader

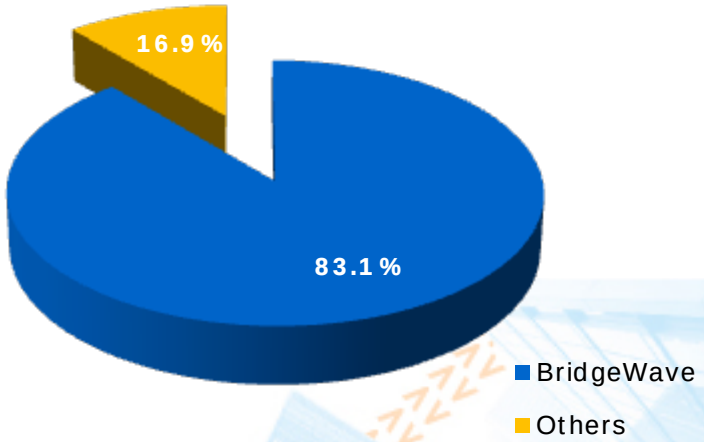
Ultra-High Capacity Ethernet PTP Market

Data from EJL Wireless Research (Nov 2010)



U.S. FCC 70/80 GHz Registrations

Data from 1/1/2011 thru 6/30/2011 based on FCC 70/80 GHz Registration Database



Picocell Backhaul: New 4G Paradigm

- **2G / 3G networks focused on coverage <u>not</u> capacity**
  - Macro-cell approach was adequate, 3-5 km radius
    - Access = 100Mbps
    - Aggregation = 300 Mbps

- **4G is all about capacity**
  - 10-100 Mbps to handsets
  - 170 Mbps per LTE sector
  - Higher backhaul rates needed e.g. 1 Gbps
  - Data rates to devices affected by distance from base station

- **Ubiquitous, high speed coverage requires divergence from macro-cell model**

What is Cellular Backhaul?

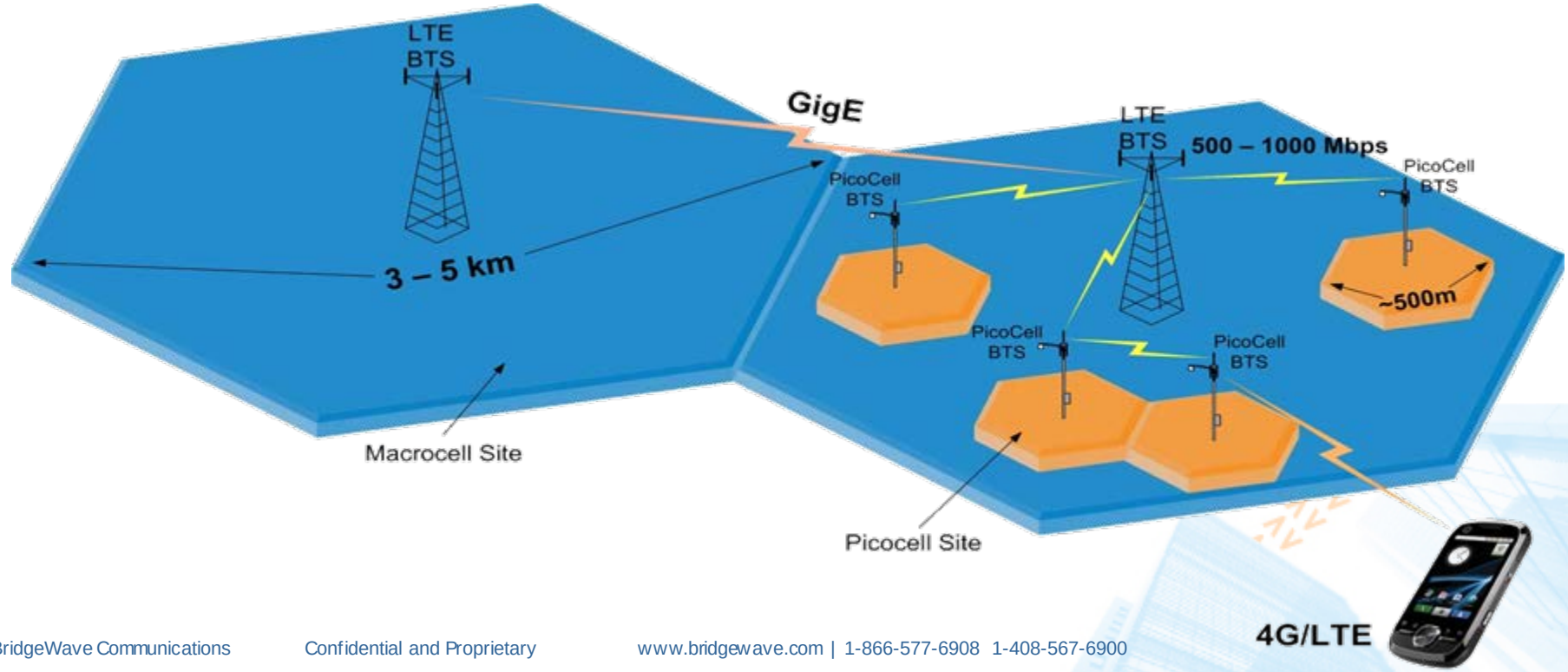
~65% of backhaul worldwide is Microwave

~$12B annual equipment market

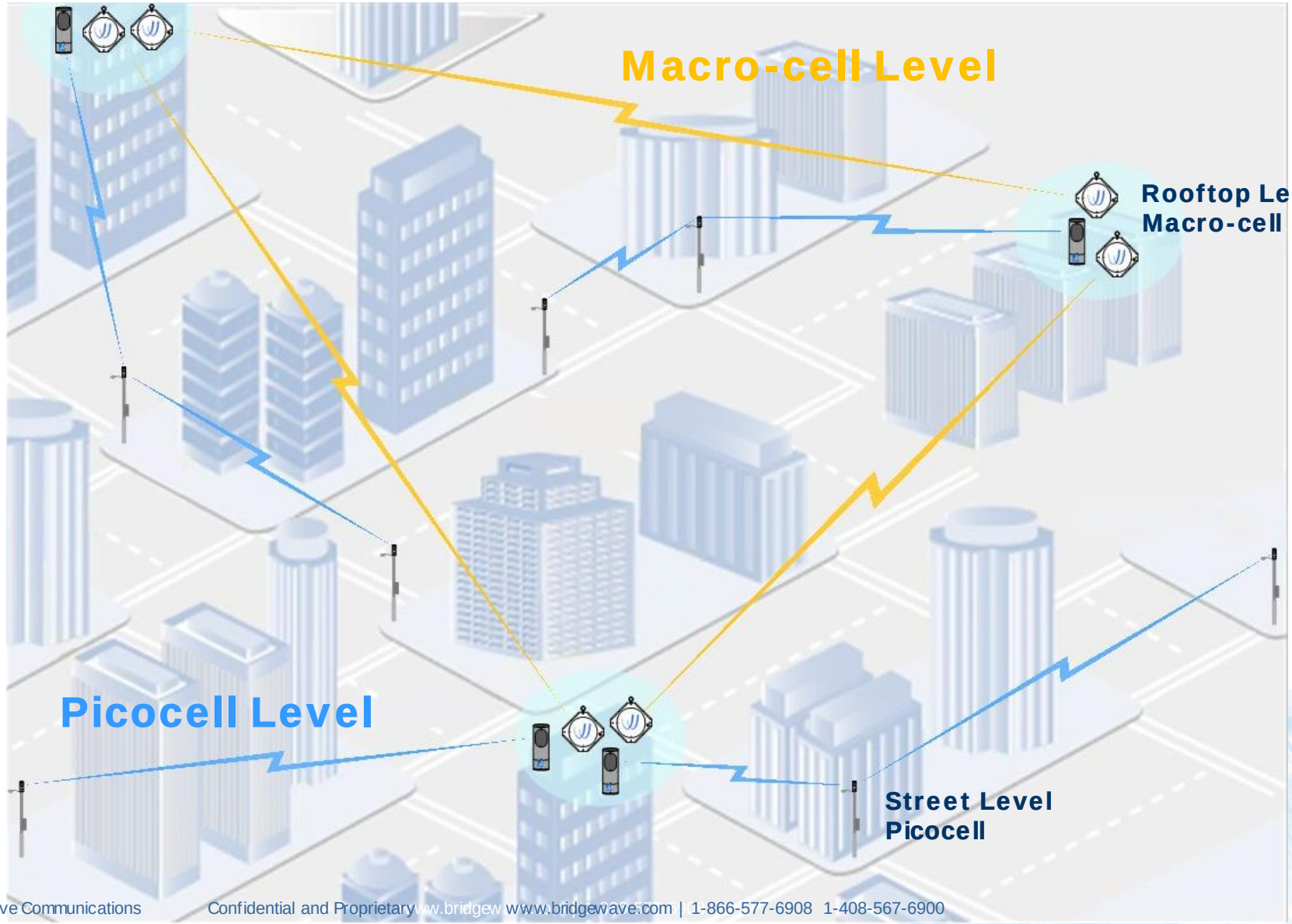
Source: Maravedis Wireless Backhaul Market from an All-IP Perspective, May 2011

Picocell Drivers

- **To meet 4G capacity needs, higher base station densities are a requirement.**
- **To achieve this economically, small / inexpensive cells around the macro-cell required.**



Usage Models



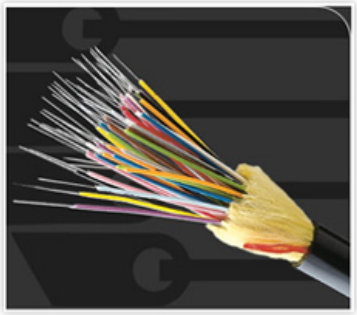
Picocells Are In Demand

- **Deployments required in diverse locations**
- **Large number of nodes due to coverage needs**
- **Environment & Aesthetics drive small form factor**
- **High capacity**
  - Up to 1 Gbps
- **Low cost**
  - CAPEX & OPEX
- **Short deployment time**

Gigabit Ethernet Options

- **Install fiber:**
  - Access to aerial routes
  - Trenching
  - Physical obstacles
  - Permitting

- **Lease private GigE circuit:**
  - Cost
  - Lateral construction
  - Multi-year service commitments

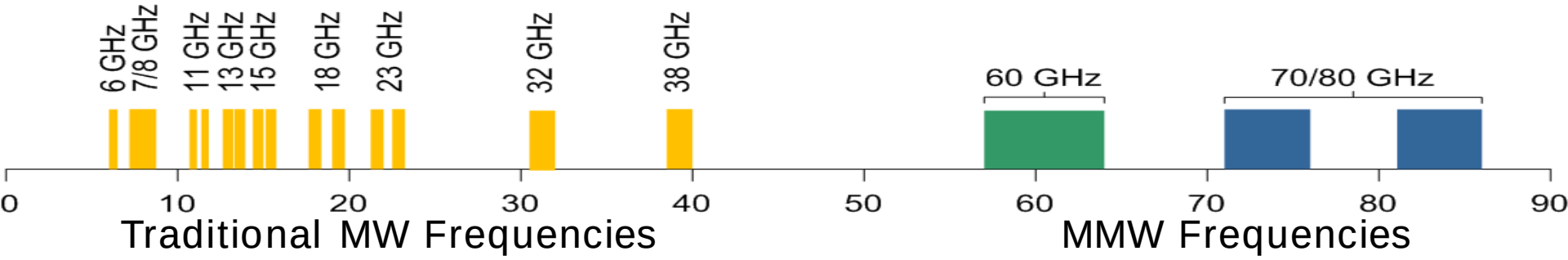


- **6 – 38 GHz Microwave:**
  - License-free subject to interference
  - Licensed subject to high licensing costs/delays
  - >Gbps unavailable or very costly

- **BridgeWave millimeter wave: Fiber-like**
  - Performance
  - Security
  - Reliability

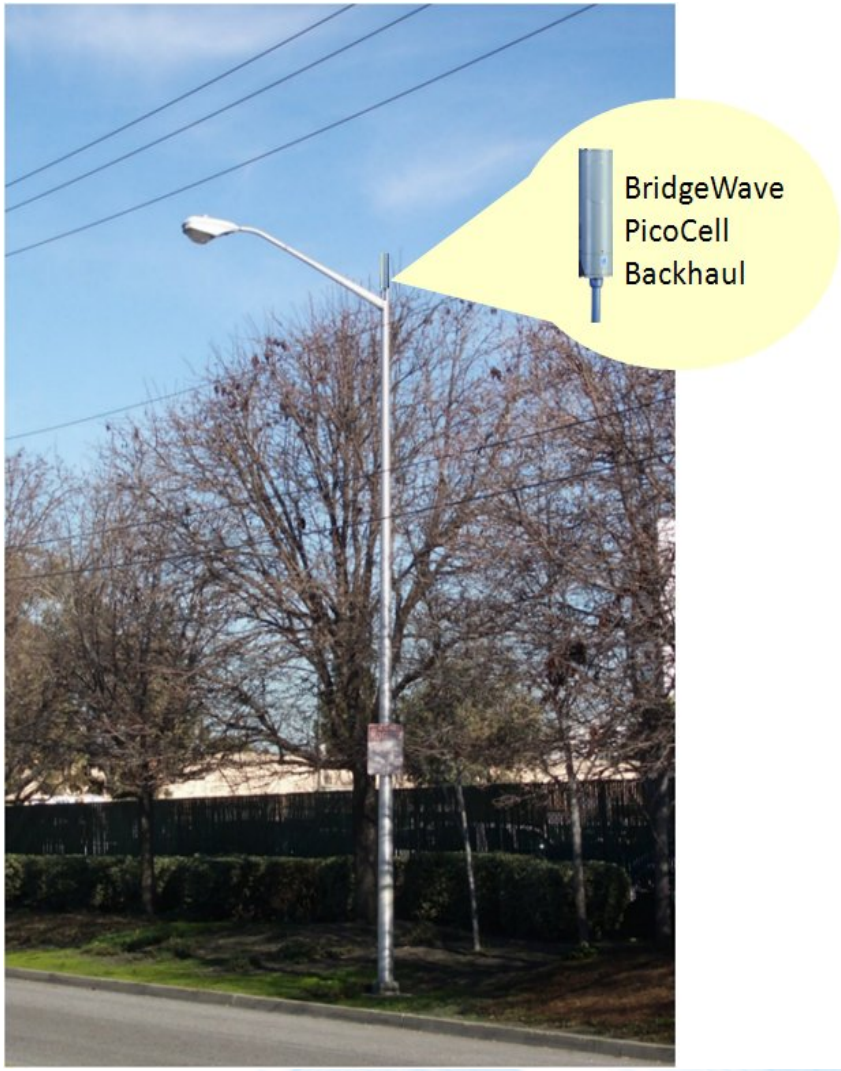
Spectrum for Backhaul

- **6-38 GHz (licensed) used traditionally**
  - Per link license typically $2K fee
  - Long distance with lower frequency
    - 6 GHz up to 50 miles, 38 GHz up to 3 miles
  - Optimized for speeds up to 350Mbps
- **60 GHz unlicensed (free)**
  - Excellent for short distances (1/2 mile)
  - Gigabit speeds and urban environment friendly
- **70/80 GHz (lightly licensed)**
  - Per link license typically $100 fee
  - Optimized for Gigabit speeds up to 2 miles

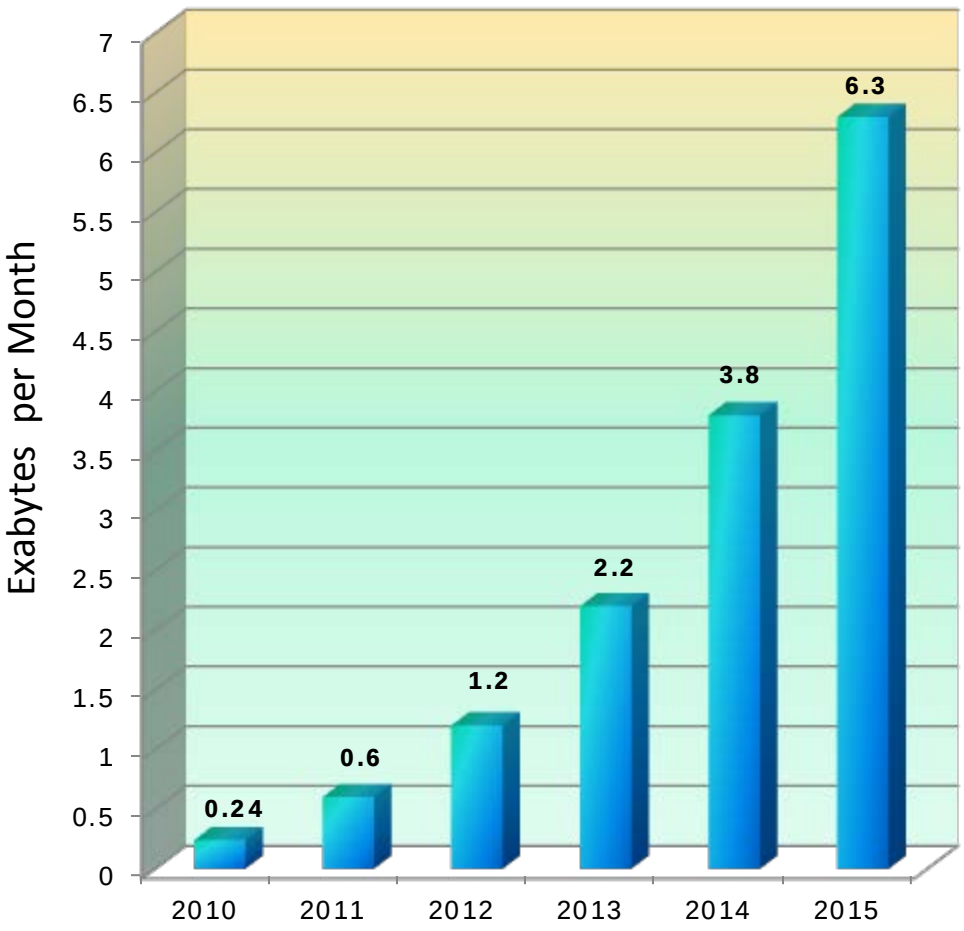


Why 60GHz is Ideal for Picocells

- **Excellent Scalability**
  - Available spectrum (7GHz) enables GigE speeds
- **Low Cost**
  - Low cost equipment enabled by new consumer indoor applications.
  - Low Opex and recurring fees (e.g. license)
- **Fast & Simple Deployment**
  - O_2 effect
  - Flexible frequency reuse
  - Minimal frequency planning
  - Support for Self- Organizing –Network (SON)
- **Good fit for urban environment**
  - Aesthetic, “concealed” solution
  - Small footprint



Wireless Traffic is Exploding with No End in Sight



Source:
Cisco Systems, Global IP Traffic Forecast and Methodology, 2010-2015, Feb 2011

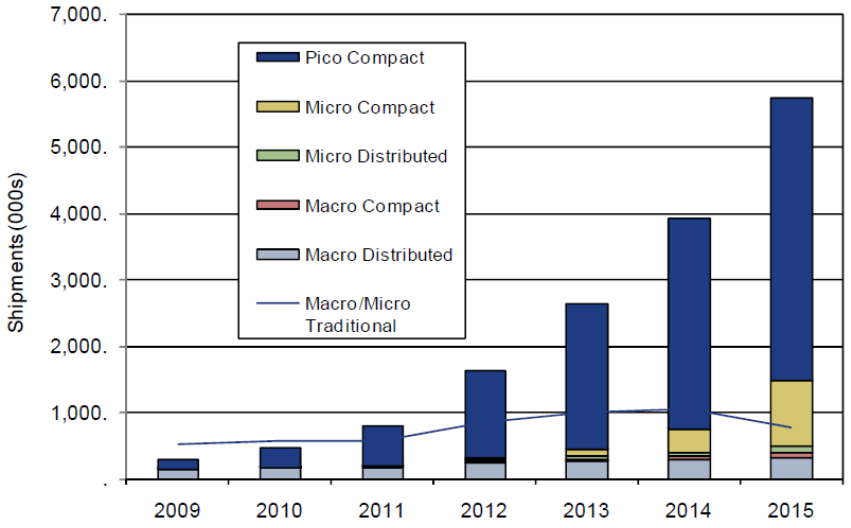
Values in Exabytes per Month

- **Mobile traffic will increase 39x between 2010 – 2015**
  - 92% CAGR
- **66% of mobile traffic will be video by 2014**
- **13% of handsets are smartphones, but account for 78% of mobile data traffic**
- ***Backhaul is the bottleneck***

Exabyte = 1,000,000,000,000,000,000 B = 10^{18} bytes = 1 billion gigabytes = 1 million terabytes

Picocell Market Size

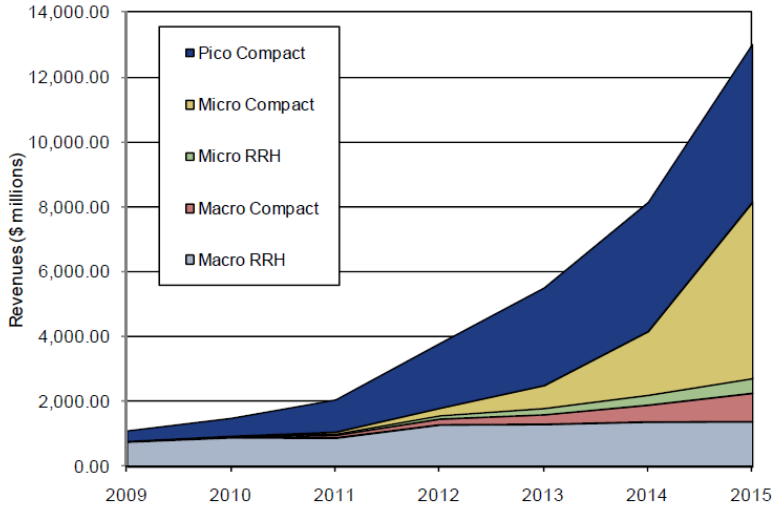
3G/4G Shipments for Distributed and Compact BTS by Site Classification: Global Forecast 2009 to 2015



(Source: ABI Research)

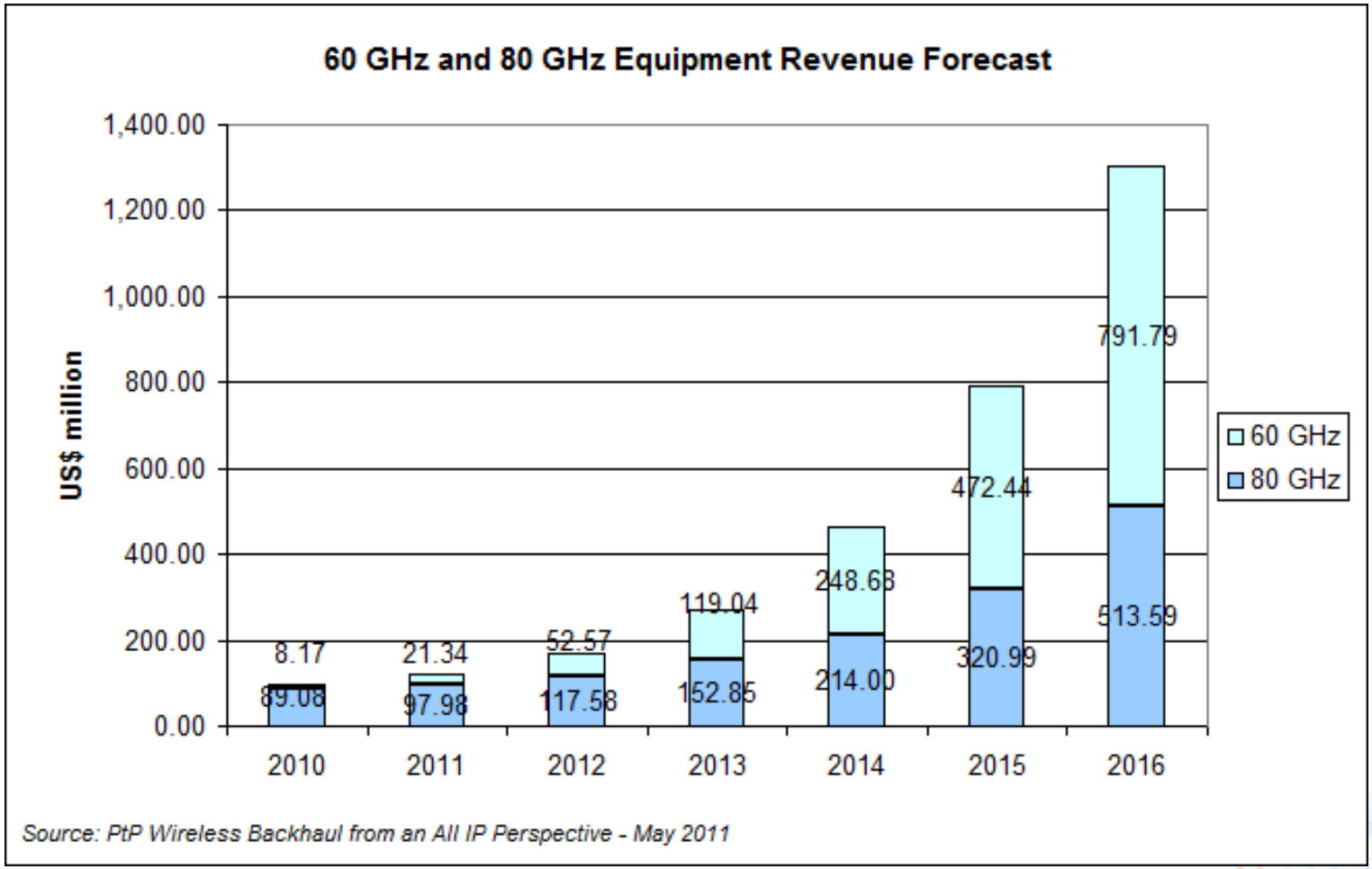
- **Picocell market**
  - Approach 5M units by 2016
  - Key enabler for 4G technology
  - Will drive most of the Cellular growth

4 *Revenues for 3G/4G RRH and Compact BTS by Site Classification: Global Forecast 2009 to 2015*



(Source: ABI Research)

Picocell 60GHz Backhaul Market Size



- **Overall MMW Backhaul**
  - Approach $1.2B by 2016
  - 60% of the Market 60GHz

New 4G Paradigm

- **Mobile networks up to 3G focused on coverage not capacity**
  - Macro-cell approach was adequate, 1 mile+ radius
  - Capacities under 100Mbps in access, 300Mbps in aggregation are sufficient
- **4G is all about capacity**
  - ***Short distance+high capacity= sweet-spot of MMW***
  - Only way to economically scale is with Picocells
    - Low cost equipment and low cost site acquisition
- ***By 2015 MMW Picocell backhaul will equal total Macro-cell backhaul market***

Rule Making Change is Critical

- **4G networks will enable widespread mobile broadband use & the associated social benefits.**
- **Picocells are critical to realizing the promise of 4G speeds.**
- **Picocell Backhaul is currently the most critical technology challenge for Picocell deployment**
  - Evidenced by operator feedback at the most recent IWPC conference.
- **Immediate adoption of the proposed rules will be a key solution (if not THE key solution) for this backhaul challenge.**

The Proposal

- **Eliminate anomalies in the FCC's rules that effectively force license-exempt 60 GHz P-P links to operate well below the 27 dBm power limit in Section 15.255(e)**

  1. Provide EIRP-based alternative to existing in-band power density rule – 15.255(b)(1)
     - Limit average EIRP to:

       82dBm - 2dB per dB antenna gain below 51dBi
     - Vendors may choose to meet current PD rule or new EIRP rule
  2. No changes to:
     - Peak power limit – 15.255(e)
     - Out-of-band emission limits – 15.255(c)

- **Confirm that "outdoor link" exemption from Tx ID Requirement (Section 15.255(i)) also applies to antennas located indoors but directed outside a window ("window links")**

Thank You

For more information:

White Papers:	http://www.bridgewave.com/solutions/whitepapers.cfm
Case Studies:	http://www.bridgewave.com/solutions/casestudies.cfm
Data Sheets:	http://www.bridgewave.com/products/default.cfm

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