Affordable Design Techniques for Broadband DAS Expansion

Rand Skopas
Dir. of Field Sales

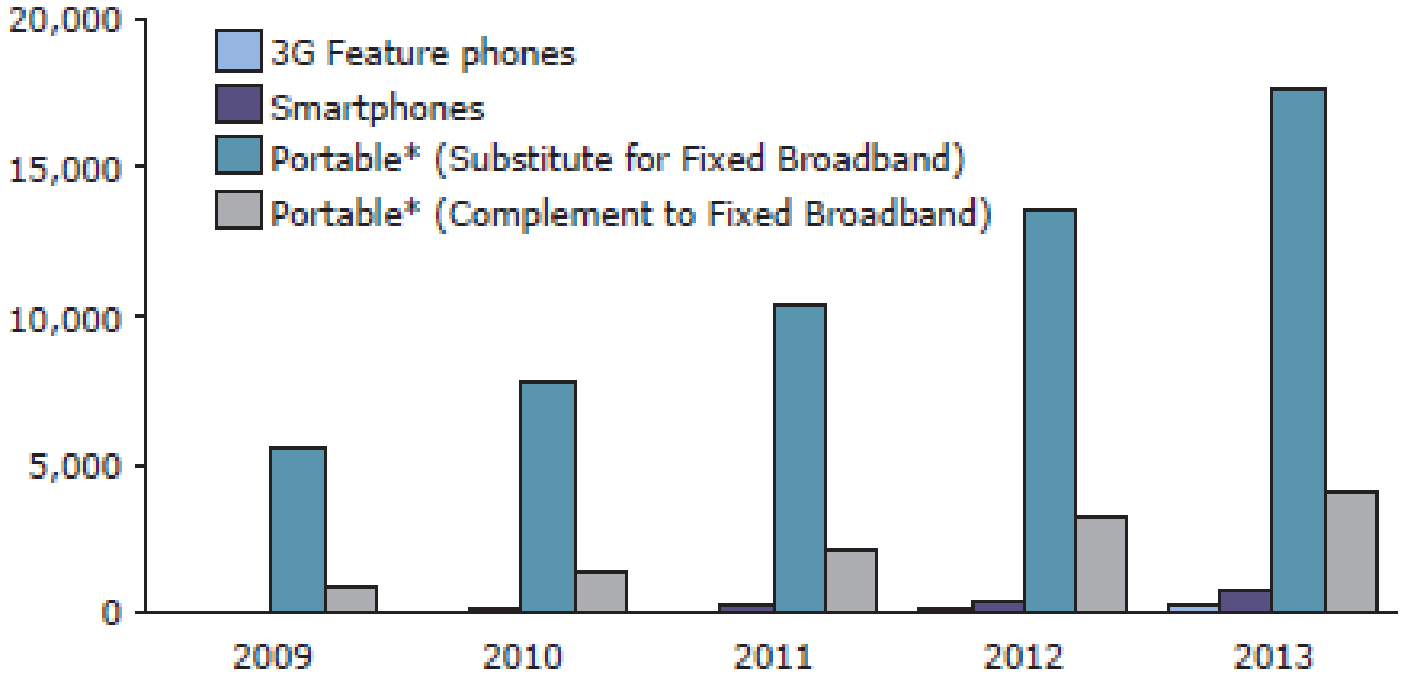
Agenda

- Challenges of frequency expansion in DAS systems
- Directional couplers and signal tappers
- DAS applications for directional couplers and signal tappers
- System integrator design approach using signal tappers versus directional couplers
- Cost comparison
- Conclusion

Mobile Usage and Functionality Growth Drives…

Projections of usage by device type

MB/month/device

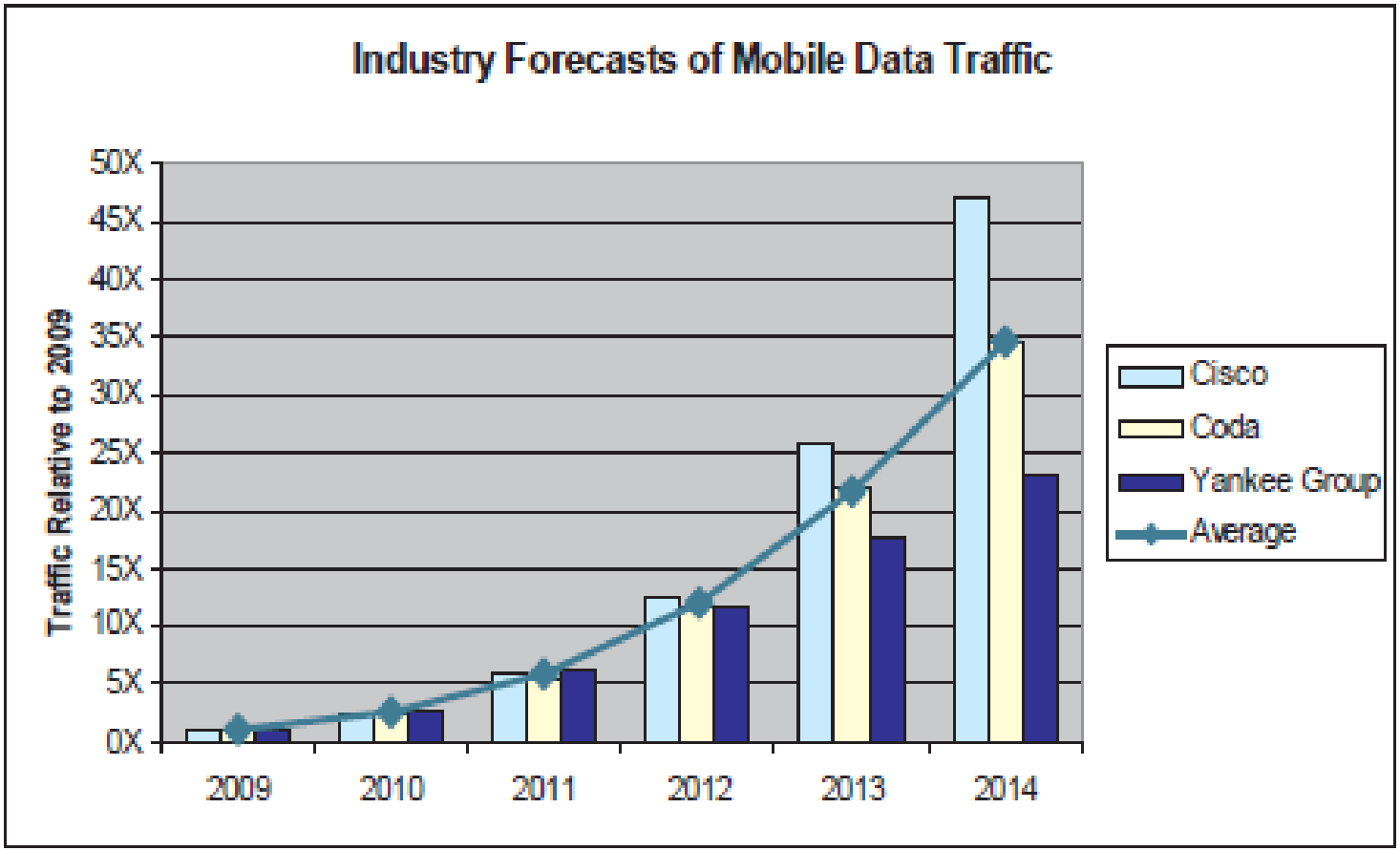


* Portable refers to computing devices (netbooks and notebooks), tablets, handheld gaming consoles, e-readers, digital cameras and camcorders, digital photo frames, and in-car entertainment systems

Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

…Mobile Traffic Growth, which Drives…

Industry Mobile Data Forecasts



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…Infrastructure Investment by Carriers…

Q4 2010: AT&T reportedly on track to roll out 4G LTE network in mid-2011 while upgrading 3G service. Faster speeds support current users and serve as a fallback during full 4G roll-out.

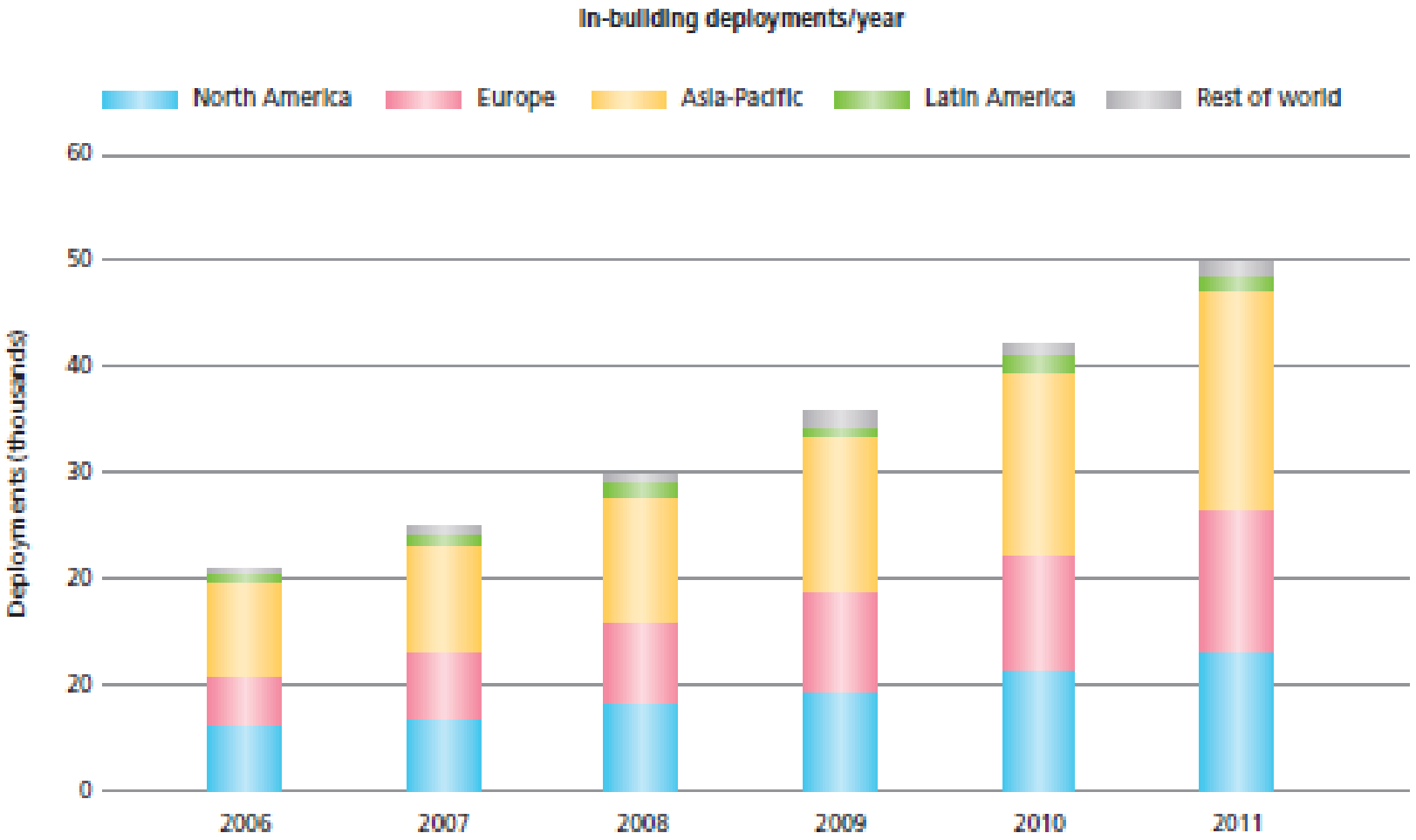
…and More Carrier Investment…

12/1/2010: Verizon Wireless announced it will launch the first large-scale LTE (4G) cellular network on December 5, bringing service to 38 metropolitan areas and 60 airports in the United States.

Industry Partnerships Drive More Growth

Q1: Apple announces release of Verizon-compatible iPhone4 for Feb 11, 2011.

DAS and Wireless Infrastructure Growth



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Frequency Expansion Challenges in DAS

- Covering frequency extremes in a single system
- Economic factors that lead to compromised performance
- Performance trade-offs during the design stages

Directional Coupler

VS.

Signal Tapper

Directional Couplers

- What directional couplers do
- Internal technology
- How they work
- Why they work for DAS applications

Microlab Directional Couplers as examples

380-2700 MHz

CK-76N (CK-76D) 6 dB

CK-77N (CK-77D) 10 dB

CK-75N (CK-75D) 15 dB

Introduction to Tappers

- What tappers do
- Technology (design approach)
- How they work
- Why they work for DAS applications

Tapper - Directional Coupler Comparison

- Directional couplers
  - Broadband (380-2700 MHz)
  - Low PIM/high power
  - High directivity, high isolation
  - RoHS compliant/IP65
  - Higher cost, similar coverage: **up to 2.5 times the cost!**
- Tappers
  - Ultra broadband (350-2700 MHz)
  - Lowest PIM/highest power
  - RoHS compliant/IP67
  - Low cost: **Increased profit margin with no negative impact on system performance!**

Tappers: Typical vs. Microlab

Frequency bands: 800 – 2,500 MHz.	350 - 2,700 MHz
Loss: <0.3 dB max. (main line)	0.1 dB max. (main line)
Power: 100W avg., 3 kW peak	500W avg., 3 kW peak
Impedance: 50Ω nominal	50Ω nominal
PIM: Not applicable	<-150 dBc
Environment: IP64, 0°C to +50°C	IP67, -35°C to +75°C
Connectors: N(f) or 7/16 DIN (f) tri-metal plate:	Same
Housing finish: passivated aluminum:	Same
Weight, nom: <16 oz. (430 g)	14 oz. (380 g)

Microlab Signal Tappers (350-2700 MHz)

DN-34FN 2:1/3.0dB -1.8/-4.8

DN-44FN 3:1/4.8dB -1.3/-6.1

DN-54FN 4:1/6.0dB -1.0/-7.0

DN-64FN 6:1/8.0dB -0.7/-8.6

DN-74FN 10:1/10dB -0.4/-10.4

DN-84FN 20:1/13dB -0.2/-13.2

DN-94FN 30:1/15dB -0.1/-15.1

DN-04FN 100:1/20dB -0.1/-20.1

DN-14FN 1000:1/30dB -0.1/-30.1

*In range 350 - 380 MHz branch flatness is ±1.0

DAS Applications for Directional Couplers & Tappers

- DAS requirements to divide signal power into unequal ratios
- Where tappers are used in the broadband DAS
- Where directional couplers are used in the DAS

Directional Coupler

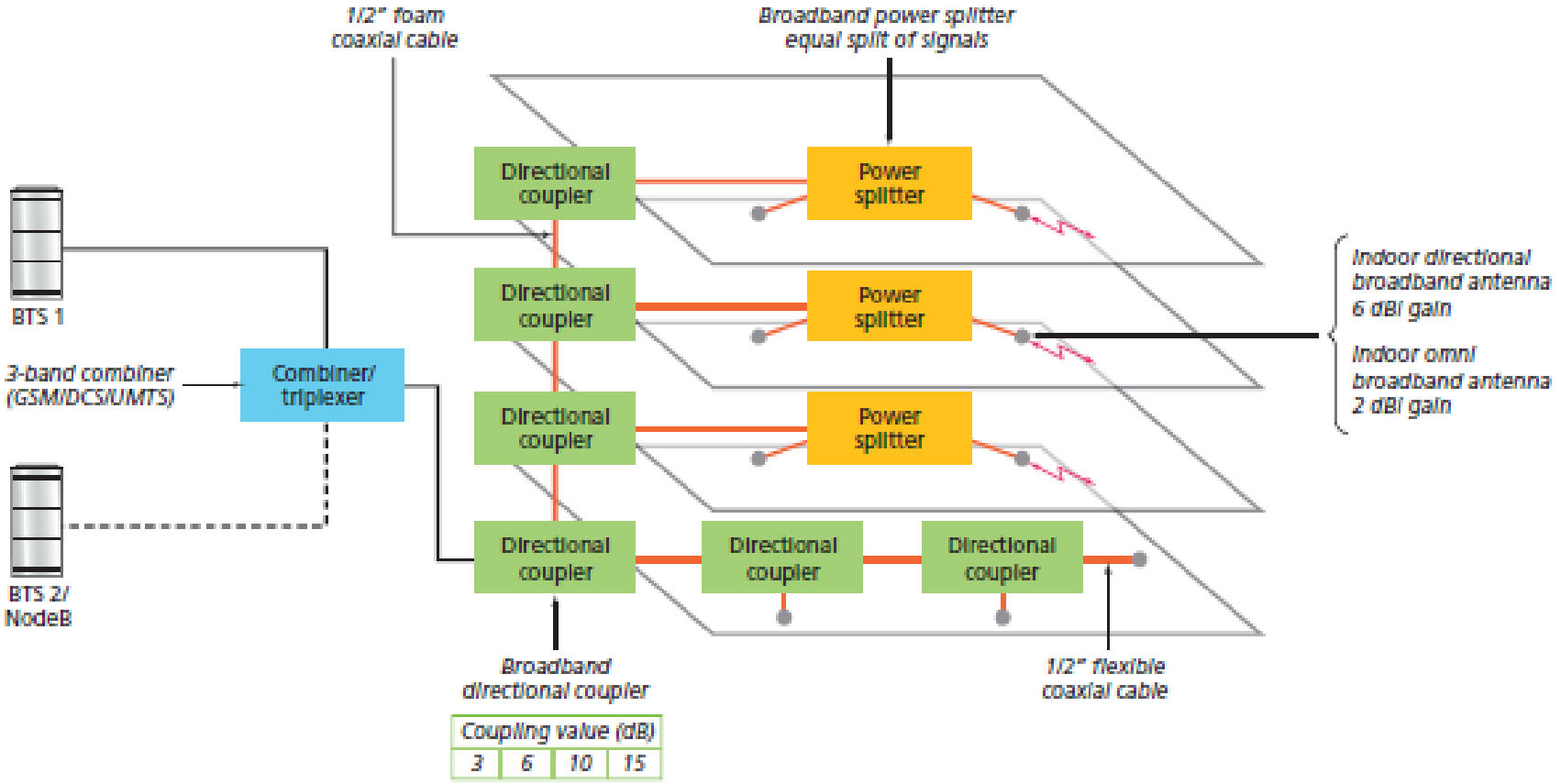
VS.

Signal Tapper

System Design

- Compensation techniques to transition from directional couplers to signal tappers
- Simplifying the issues
- Implementing the changes
- Deploying the system

Directional Couplers in DAS



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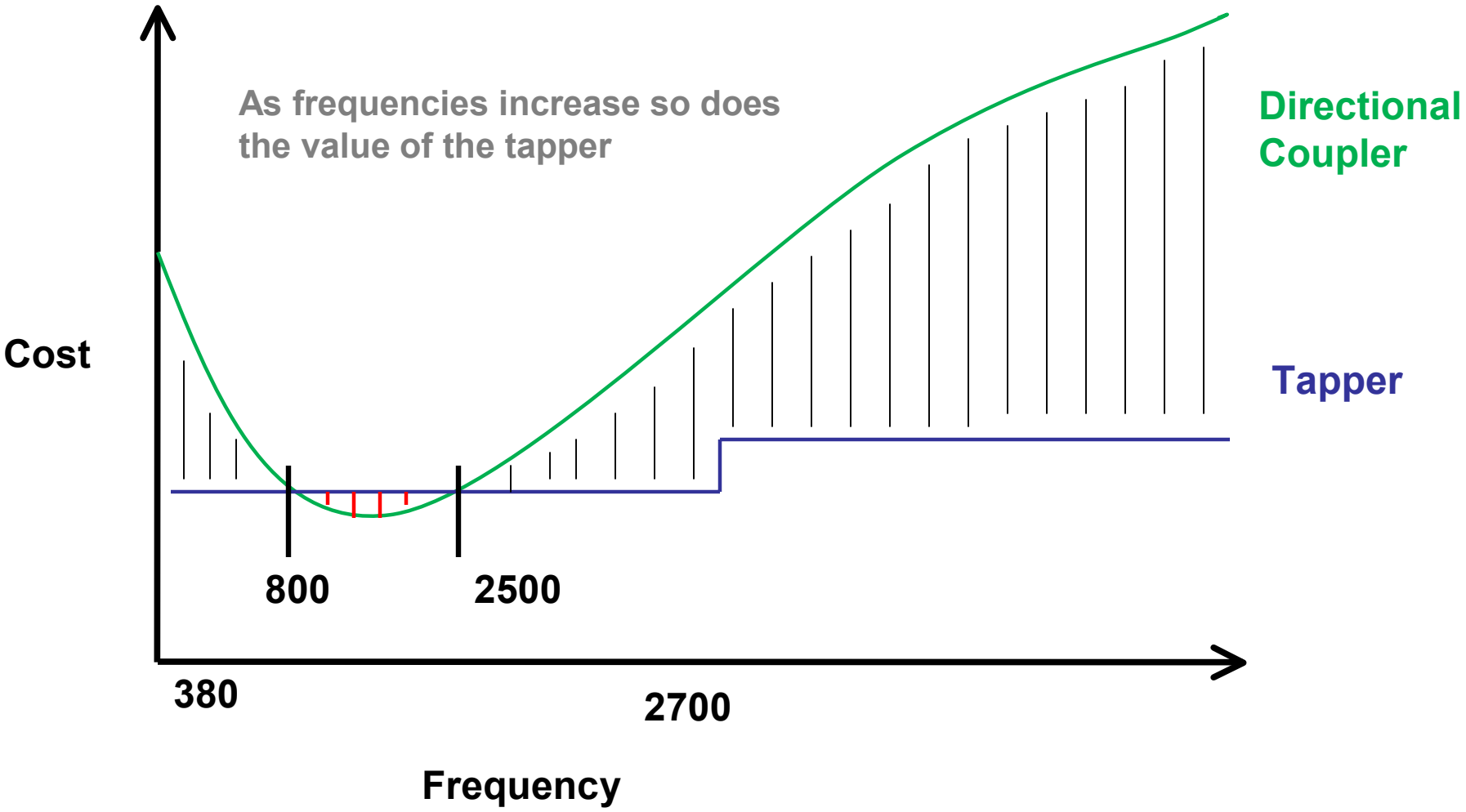
Value Comparison

- Frequency versus cost
- Cost of broad-band/future-proof
- Paying for PIM

Tapper Value Graph



Microlab Directional Couplers

- Frequency range: 380 to 2700 MHz
- VSWR, max: 1.20:1, all ports (1.30:1, >2500 MHz)
- Power handling: 200W avg., 3 kW peak*
- Directivity, min: 20dB, (18dB >2500 MHz)
- Impedance: 50Ω nominal
- Intermodulation, PIM: <-140 dBc with 2 tones
- +43 dBm; <-150 dBc to order
- Environment: -35°C to +75°C, IP64 (IP67 to order)
- Housing finish: passivated aluminum
- Connectors: triplate, female

Microlab Company Overview

- A Wireless Telecom Group company founded in 1949, designs and manufactures high-performance passive RF and microwave solutions, such as dividers, directional couplers, filters and integrated multi-carrier combiner systems

- Distinctive Component Characteristics:
  - Broadband
  - Low loss
  - Low PIM
  - Superior quality construction

- Our Solutions are used in:
  - Cell towers
  - Radio base stations
  - In-building DAS
  - Global transportation/communications systems
  - Homeland Security systems

Wireless Telecom Group

Boonton Microlab Noisecom

Thanks for participating!

Any questions?

Please join us for our next webinar about:
DLTS 7200 presented by Boonton Electronics

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Next Steps to a Solution

Contact Microlab TODAY
to discuss your system requirements

Rand Skopas
+1 (973) 386-9696 ext. 3114
rskopas@wtcom.com

Danny Larsen
+1 (973) 386-9696 ext. 3109
dlarsen@wtcom.com

Tony Ramsden
+1 (973) 386-9696 ext. 3111
tramsden@wtcom.com