International Telecommunication Union

Wireless and Coax Transport

Latest developments in Home Network Transport Technologies

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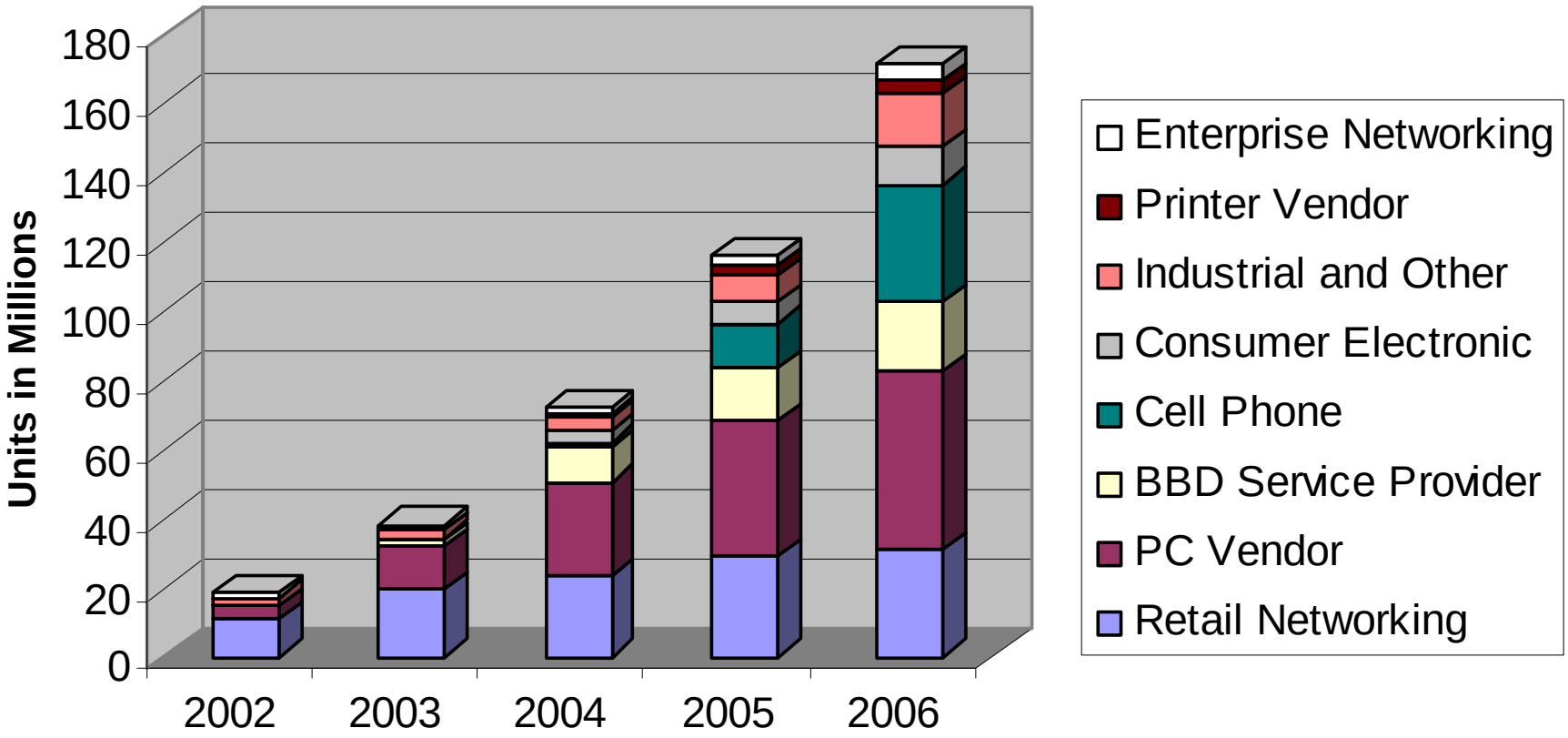
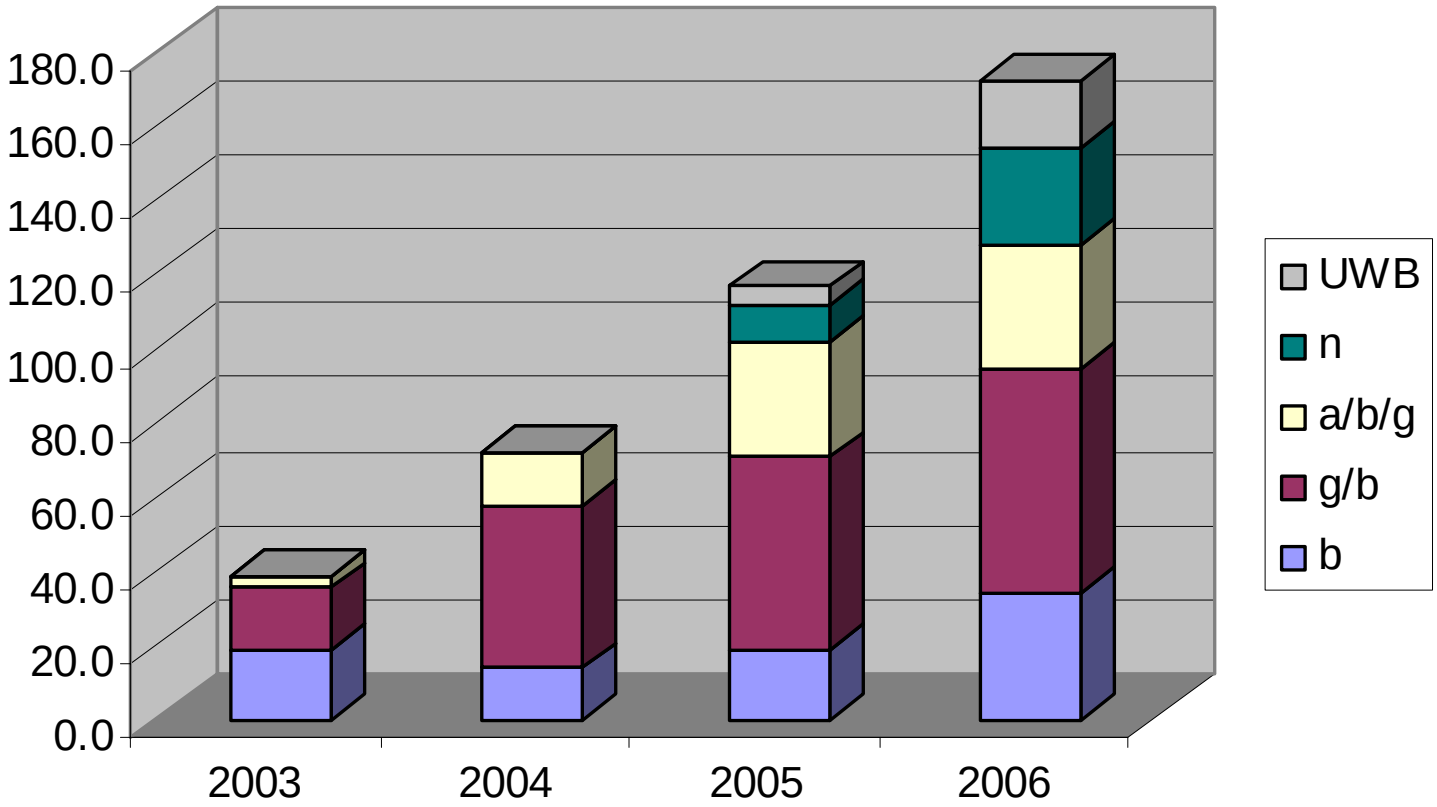
Digital Video Home Needs

- Digital PVR and Streaming Content to multiple TVs
- Enable whole home
  - One set of content on any TV
  - Distributed from a Home Media Server
- No new wires
  - Coax, Wireless, Power
- Content to TVs not PC
  - Ethernet, phone wire of limited use
- Quality of Service
  - Prioritized delivery
- Wireless and Coax deliver high throughput with quality

WLAN Market Growth: Diverse Platforms

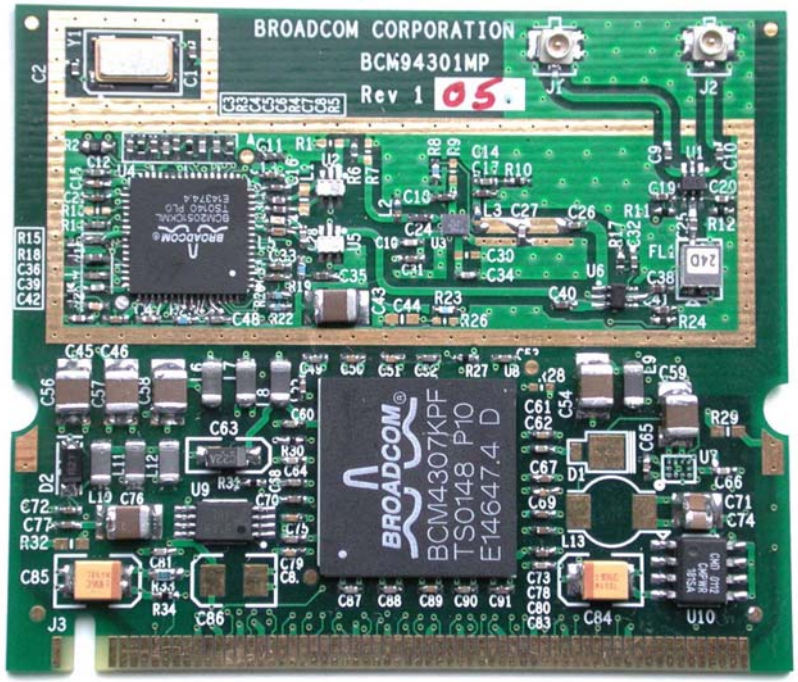


WLAN Market by Technology



- **802.11g is new mainstream Wi-Fi**
- **Next broad technology transition is 802.11n in 2005**

Wi-Fi Solutions becoming smaller



87% Smaller

50mm x 60mm
1.97in x 2.36in

14.8mm x 26.5mm
0.58in x 1.04in

The Pace of IEEE and Wi-Fi Alliance

- Schedule and Timeline is now general public news
- Market needs sometimes outweigh academic completeness
- The Wi-Fi Alliance (as an industry consortium) has stepped up to accelerate usable standards:
  - 802.11a/b/g → Interoperability certification
  - 802.11i → WPA specification
  - 802.11e → WQoS specification
  - 802.11n → Marketing Requirements Document
- Wi-Fi Alliance has shifted from passively certifying the standard after it was done, to accelerating completion, to now driving the IEEE requirements to initiate a standard

Relevant Standards on the Horizon

- 802.11 QoS – WQoS/WME/802.11e (2004)
  - Priority based Quality of Service
  - Allows Wireless VoIP and video distribution in the home
- 100 Mbps 802.11 (WLAN) – 802.11n (2005)
  - Throughput approximately 3 times 802.11g
  - Compatible way for additional HD video streams in the home
- 480 Mbps 802.15 (WPAN) – 802.15.3a (2006?)
  - Ultra Wide Band (UWB)
- UPnP(QoS) / DHWG
  - Discover and Control Consumer Electronic equipment

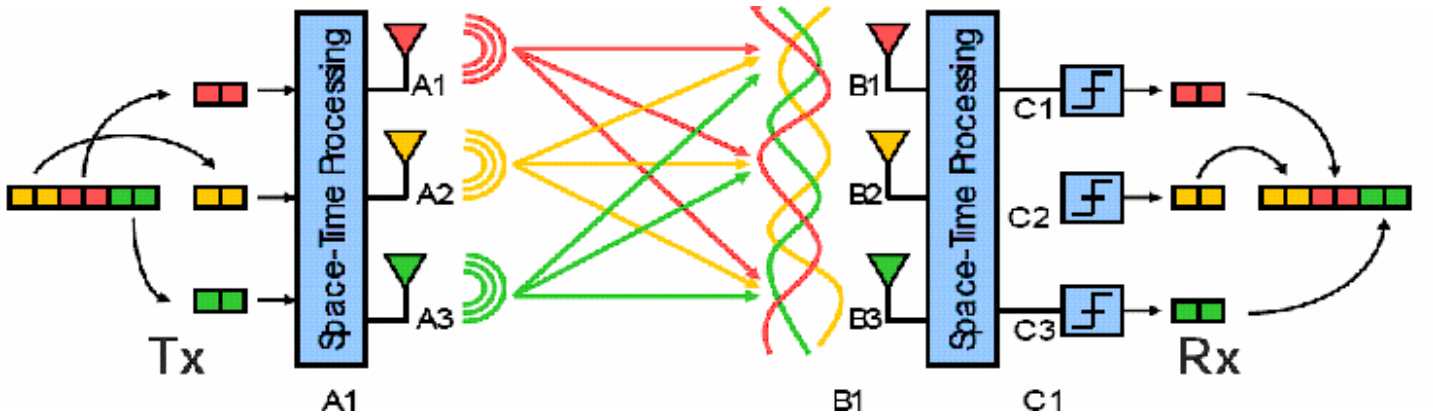
WQoS / WME Status

- WME Specification / Test Plan complete
- Interoperability proven
- Wi-Fi Certification begins 1-Sept-2004
- Product support already being announced

- More Details in Session 6

IEEE 802.11n Basics

- Compatible with 802.11g and 802.11a
- Uses same bands as 802.11g (2.4 GHz) and 802.11a (5 GHz)
- PHY and MAC improvements to achieve 100 Mbps MAC throughput
- Higher spectral efficiency
- Technologies being considered:
  - 20 and 40 MHz bandwidth channels in 5 GHz band
  - MIMO – Multiple Transmission (1-4) or Reception (1-4) Antennas



IEEE 802.11n Status

- Task Group “n” recently formed in IEEE
- Technology Selection Procedure and Channel Model documents completed
- Specific Technology proposals expected from September 2004
- Specification in 2005 or 2006
- Products in 2005

IEEE 802.15.3a Basics

- 802.15.3a (UWB) is targeted to be a high speed BlueTooth (802.15.3)
- Wireless Personal Area Network (WPAN)
  - Only a few nodes connected together
  - Short range – a few meters – same room
  - High throughput
    - Typically about 100 Mbps
    - Up to 480 Mbps in short range extended modes

IEEE 802.15.3a Status

- Group mired in Selection Procedure
- Two camps – neither one can achieve 75% approval
- Some questions about FCC approval

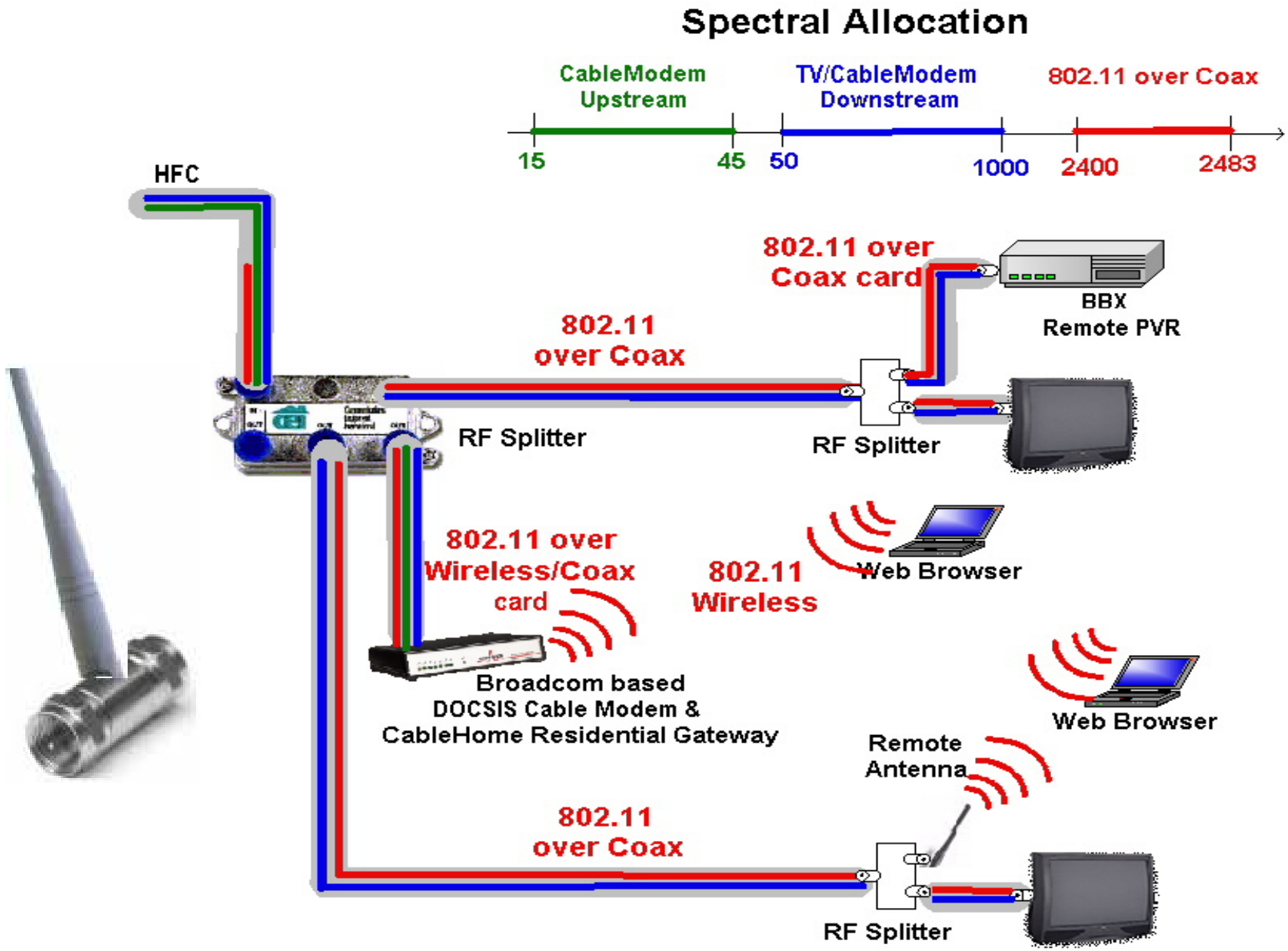
Coax Home Network Technologies

- IP-based
  - 802.11 over Coax
  - HPNA over Coax
  - MoCA e.g. Entropic, Tiaris
- Non-IP-based
  - Channel 3/4 Analog RF Modulation
  - Digital Video Over QAM

802.11 over Coax

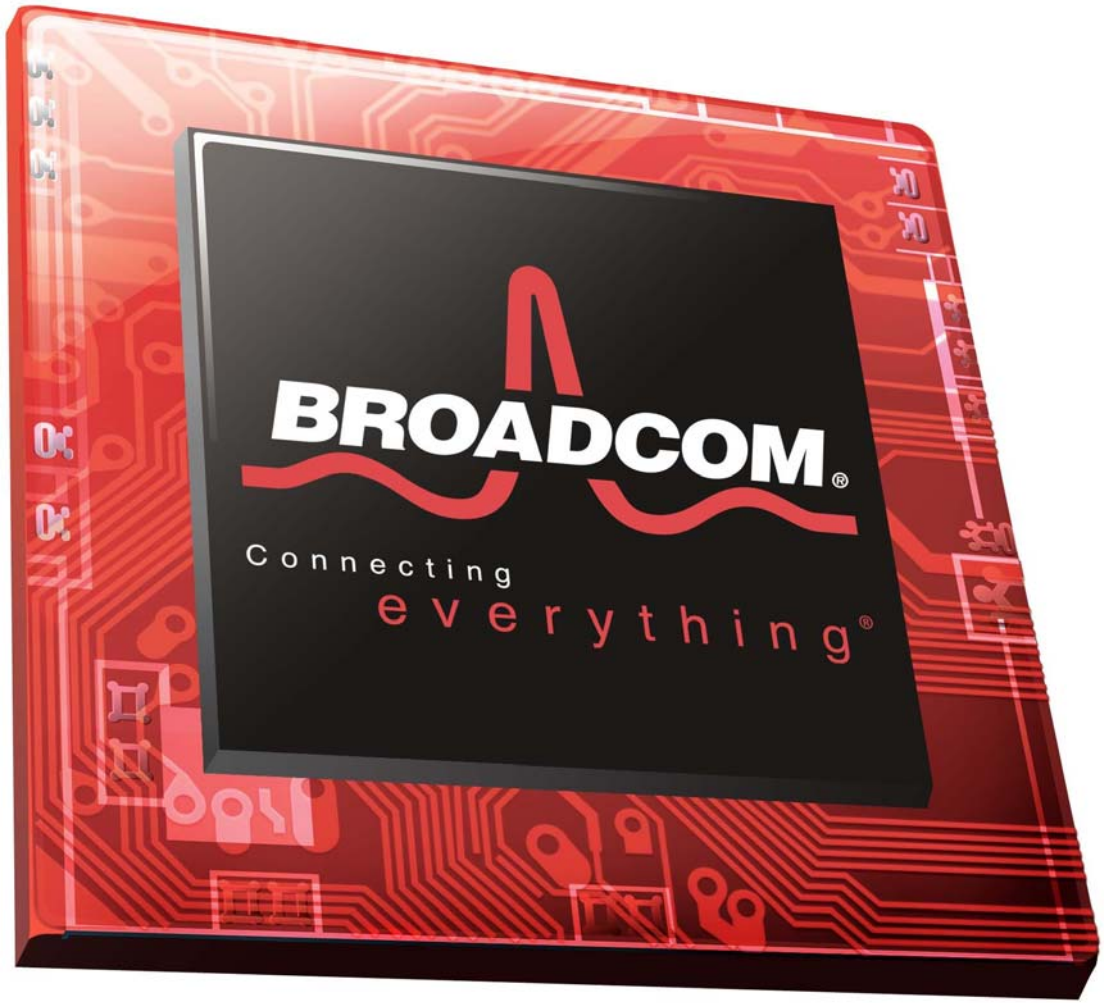
- Advantages:
  - One interface for both wired and wireless
  - Leverage mature 802.11 technology (>50Mu shipped)
  - Utilizes existing coax near television
  - 802.11 performs better on coax than through walls and other attenuators
  - Concurrent use with Cable broadcast signals and DOCSIS (Cable Modem)
  - Coax to 802.11 bridge is passive (low cost)
- Challenges:
  - 802.11a frequencies have to much attenuation for Coax

802.11 over Coax



Summary

- Wireless and Coax deliver high throughput with quality
- No new wires
- Multiple use
  - Digital Video to multiple TVs
  - Data to PCs , PDAs
- Quality of Service
  - Prioritized delivery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