VoIP in the Wireless World

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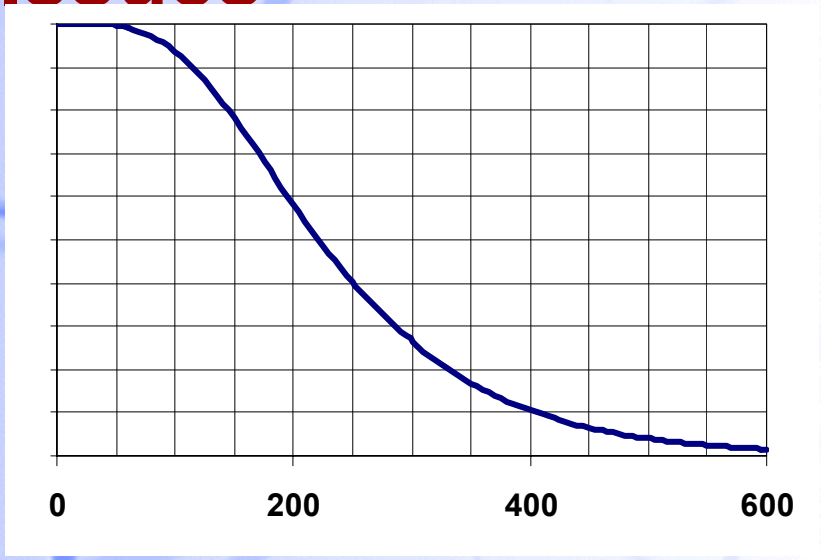
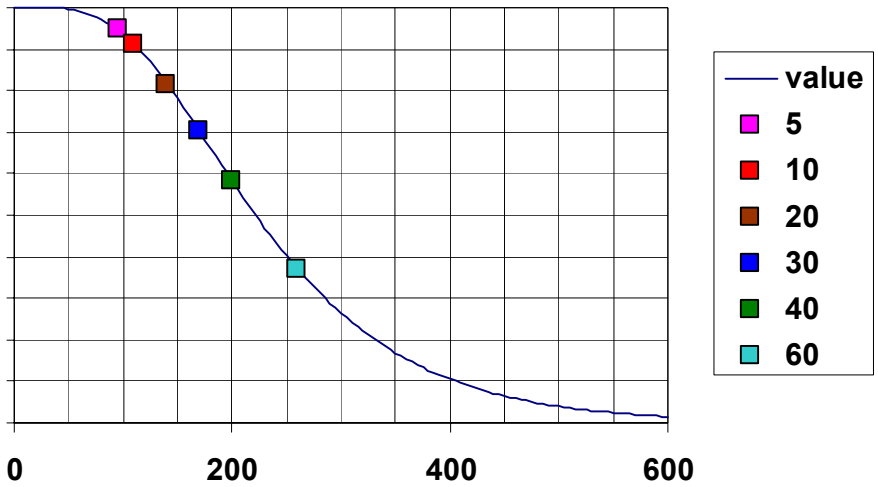
Agenda

- **Issues**
- **Standards and Market Evolution**
- **IP Multimedia Services**
  - Architecture
  - Applications and Challenges
- **Looking Ahead - Summary**

Interactive Wireless voice quality: Main Issues



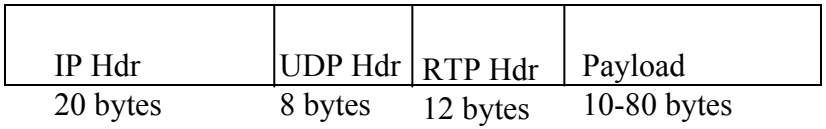


- **Delay**
  - Coding, Jitter, Packetization, Buffering, Propagation
  - Wireless Voice is already at the upper edge of the delay curve!
  - Any shift in this equilibrium will make the quality unacceptable
  - Strongly influenced by wireless link

- **Packetization Frequency**
  - Size => Delay => Quality

Interactive Wireless Voice Quality: Issues

- **Packet Loss**
  - Moderate losses (1%) can be concealed.
  - Higher losses require redundancy (standard in RTP):
    - Affects bandwidth
    - affects quality
  - Packet loss strongly influenced by wireless link
- **QoS**
  - Manage uplink contention
  - Real time voice has very stringent requirements
- **Effect of IP headers**
  - Significant header overhead
  - Inefficient use of RF spectrum when transmitted over air interface
  - Header compression improves air interface bandwidth



Can we do efficient signaling? Wireless VoIP => Mobility

- **Classic telephony approach:**
  - HLR (home) /VLR (visitor)
  - Based on phone number
  - Number = User identity + Service Profile
- **VoIP separates network, service**
  - Network: IP address
  - Service: DNS name, e-mail, URL
- **Need clean architecture**
  - SIP provides end-to-end services oriented architecture

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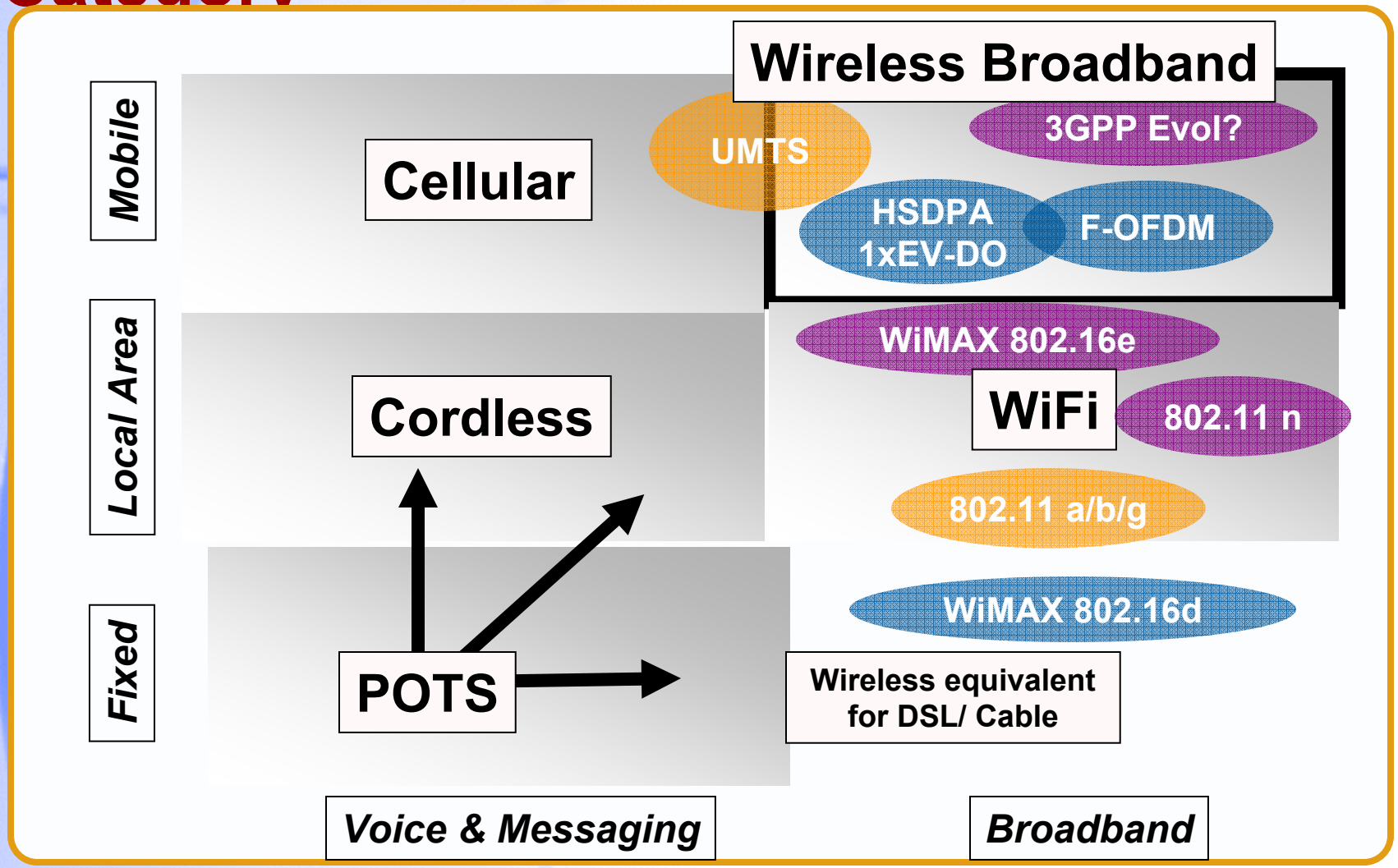
Standards and Market Evolution

Wireless Broadband – The New Category



Voice over Wireless LAN/MAN

WiFi / WiMax Voice possibilities

- Complement/alternative to cellular in target areas (city HotZones)
- Delivery of broadband voice and data services to unserviced areas
  - rural areas/towns, underprivileged areas & developing countries
  - Reduced communications cost for campus environments,
- Specialized deployments (government/military deployments, emergency)

- **WiMax is gaining popularity**
  - Not Mobile Voice: that's Cellular
    - real time, ubiquitous, urgency-driven, life-line
  - Not Enterprise Mobility: that's WiFi
    - bounded geography, best-effort, free (or nearly)
  - Emerging as high speed data access method, but service providers must bundle VoIP and other multimedia services to generate revenue

Small service providers have started implementing WiFi VoIP networks

- Demand in Corporate networks, residential areas, public spaces. Widespread availability when WiMax is fully standardized

VoIP over Wireless LAN/MAN: Challenges

- **Cellular operators fear cannibalisation.**
- **Tier 1 handset vendors fear alienating cellular operators.**
- **Dual phone mode – WLAN and WAN (CDMA/GSM) coverage.**
  - GSM/WLAN handover not yet a key industry priority
  - AND ….Some category of users don't want to part with what they are used to – attachment to personal GSM/CDMA phones. Difficult forcing them to use another dual mode GSM/VoWLAN phones. Initial offerings may not be very seamless.
- **More elegant VoWLAN handsets coming onto the market (eg Hitachi) but not many colour screens.**
- **Other major issues being sorted out**
  - Security support (encryption , authentication)
  - Access point capacity limit, QoS for prioritization
  - Proximity to access point impacts actual bandwidth
- **Handset power management and battery life**

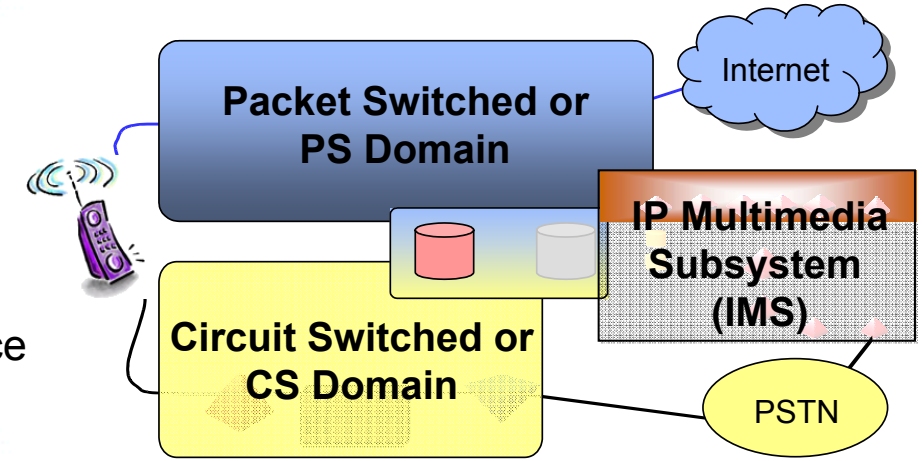
VoIP over Cellular

- **Cellular evolution**
  - CDMA 1xRTT -> EV-DO -> EV-DV
  - GSM/GPRS -> EDGE
  - and there is also UMTS
- **Cellular circuit based networks evolving to bearer independent core networks (BICN) with Call Server, Media Gateways and IP Voice Packet core (3GPP R4/R5/R6)**
- **IOS 5.0 to support packetized interfaces on BSC**
  - Can support end-to-end VoIP call
- **Transcoder Free Operation being standardized for end-to-end native wireless compressed VoIP call**
- **IP Multimedia Subsystem (IMS) / Multi Media Domain (MMD) being standardized to define services framework**

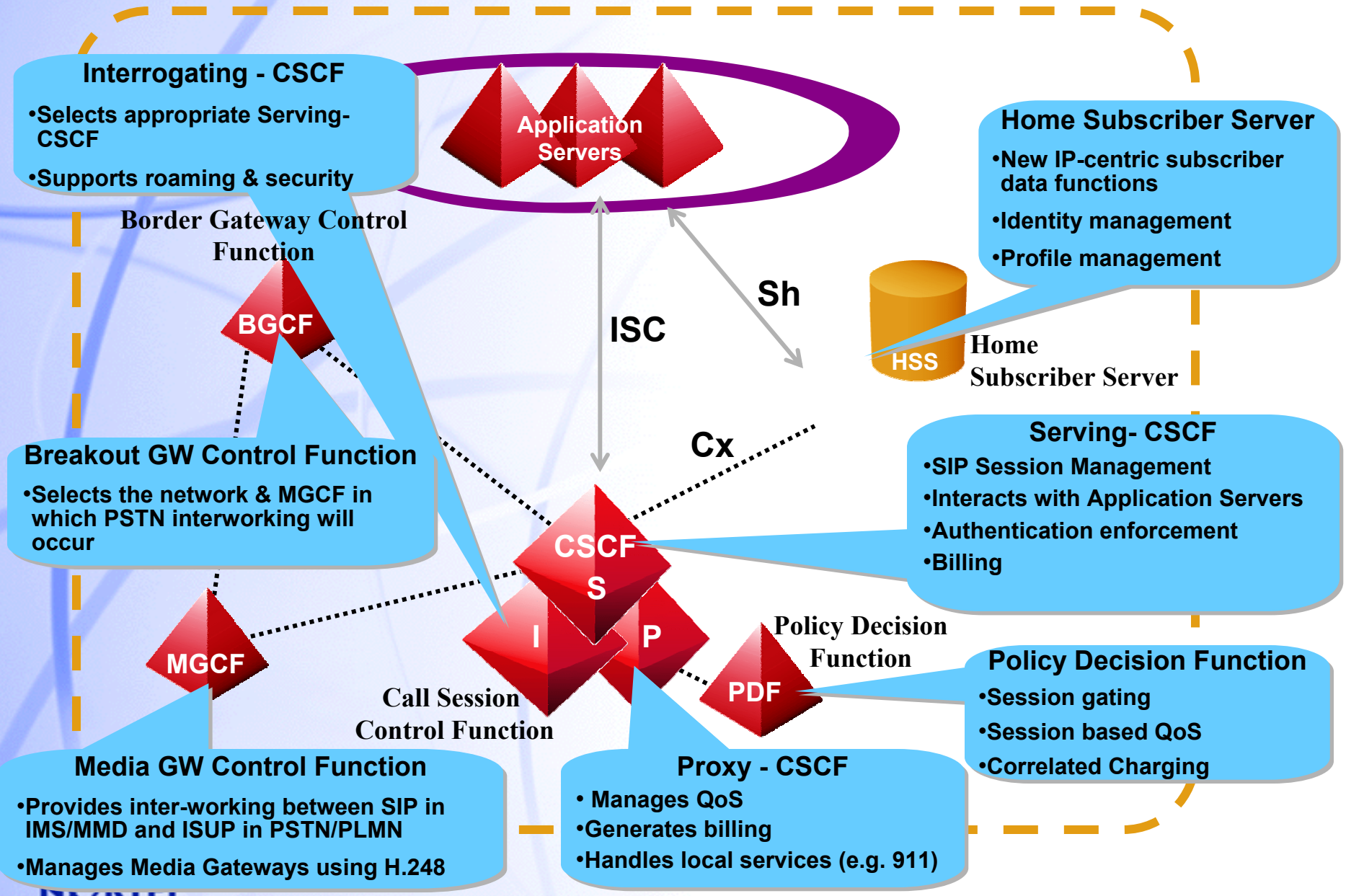
IP Multimedia Subsystem (IMS)

- **3GPP IMS Defined**
- **Standards-based Architecture for delivering ubiquitous multimedia services**
- **Initial release was for UMTS access, subsequently adopted by 3GPP2 for CDMA (MMD)**
- **Subsequent releases support access independence**

- **Key benefits**
  - —Standards-based services framework
  - —Scaleable and cost effective
  - —QoS framework
  - —Increased service innovation
  - —Decreased time-to-market for new service introduction



IMS Network Elements



The Service Centric Business Model

Building on the IMS Architecture

Service Coverage features

Multi-Device

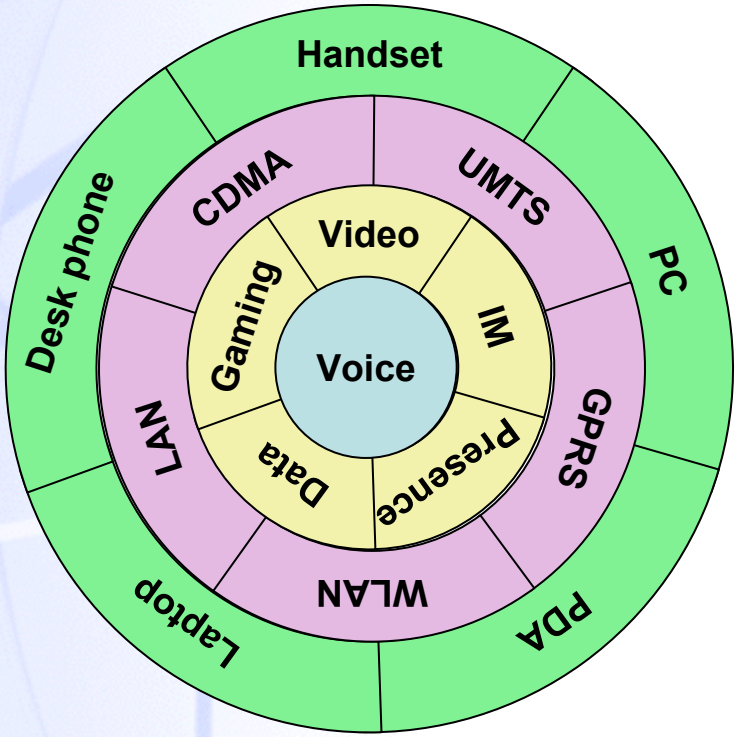
—Services adapted to various device requirements

—User selects most appropriate device depending on location and service

Multi-Access

— Interaction between a variety of access types

— Simultaneous and/or sequential use of variety of devices



Multimedia

—Add video, images, audio, and various media formats

—Mix and Match applications

—Presence & messaging can lead into a voice/ video session

—Peer-to-peer: new delivery aspect

Voice

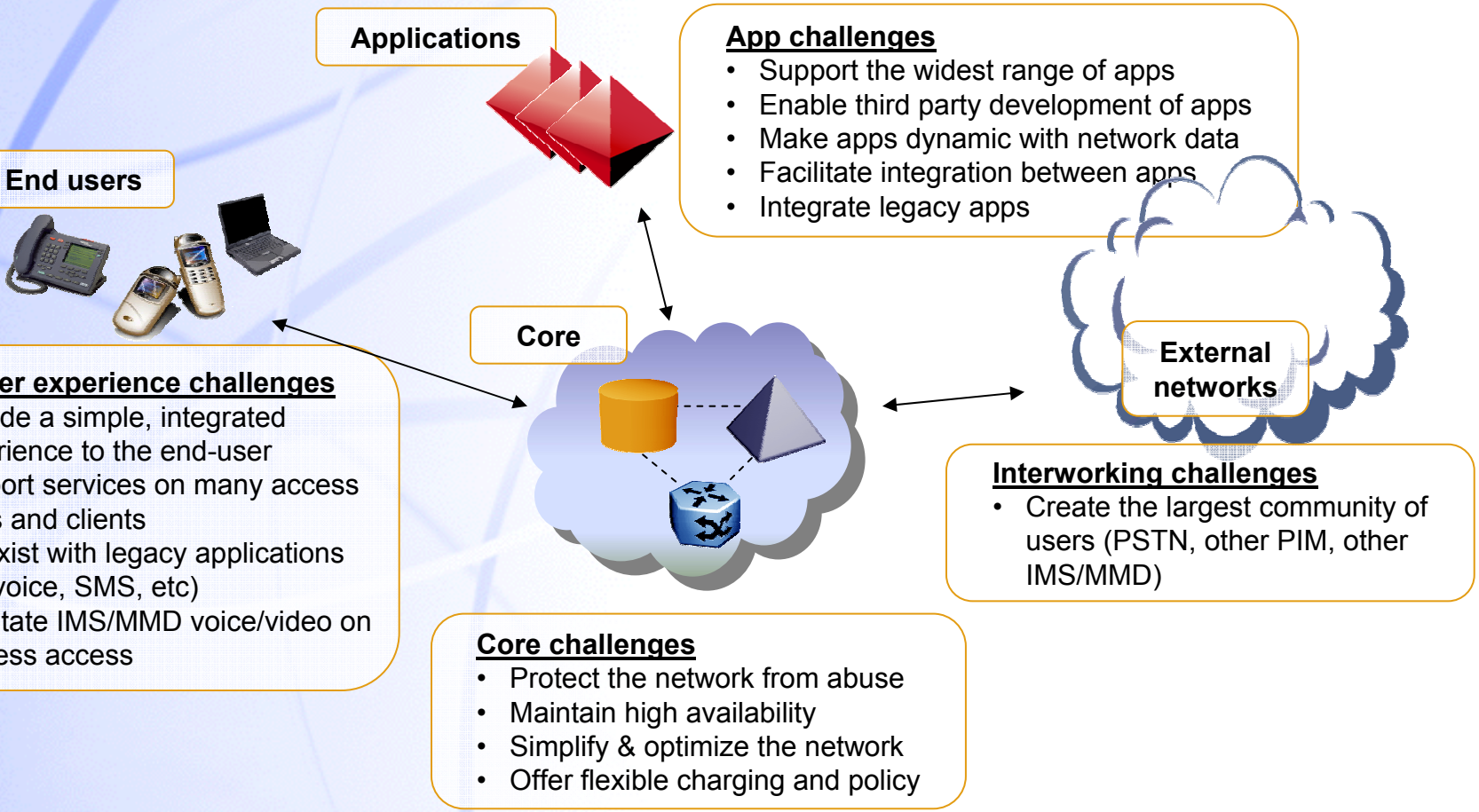
— "Cash Cow" for Wireless

— Next generation services must build on and extend voice

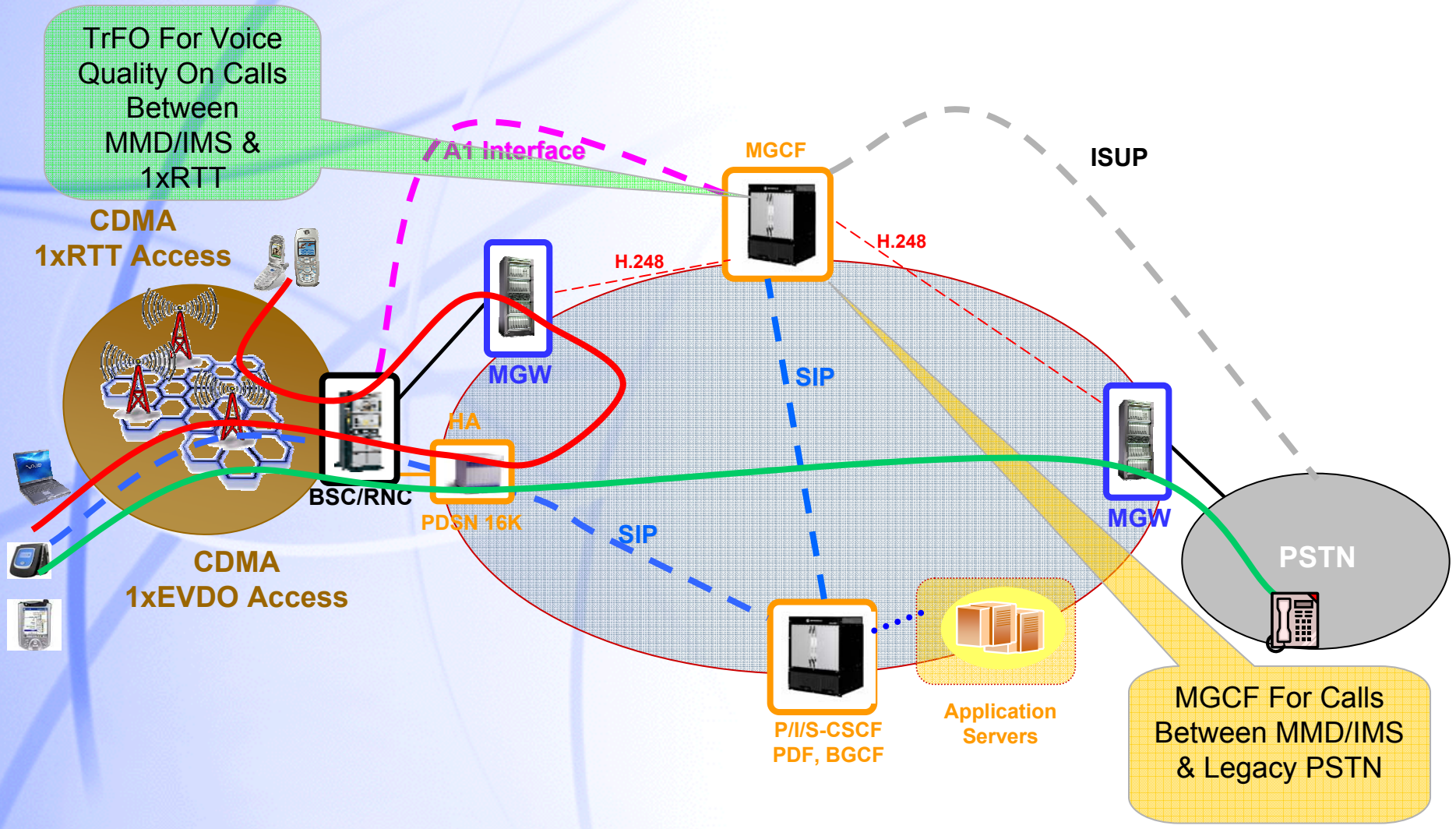
Service Innovation features

IMS delivers the basic service centric framework. Easy to deliver DIFFERENTIATION!

IMS based architecture challenges



Wireless VoIP – End to End



Looking ahead

- **VoIP will continue to be the key application driver over wireless networks – "Cash Cow"**
- **Standardization impacting PTT deployments and 3GPP IMS launches**
  - End to end SIP-based IMS architecture being evaluated by wireless operators
  - PTT deployments across many Tier-1 Operators
  - IMS trials and limited deployment across several Tier-1 Operators
- **EDGE-EV DO-UMTS will increase focus towards multimedia hungry applications**
  - Content partnerships gaining significance
- **VoIP will be key, with bundled service strategy**
  - Video, PTT & Mobile Music services, bundled with VoIP for delivery
- **Video Telephony will be in great demand among consumers**
  - Video as leading converged application with efforts to link fixed Video users to mobile video users
- **Evolution of Broadcast standards for Mobile TV implementations**
- **MMS (including video attachments) starting to be used widely**
- **SMS will continue to be important**
- **Improvements to Handsets - IM as part of the wireless handset**

The next couple of years will be the years of Mass Market Wireless VoIP and Multimedia Applications

Thank you

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