Cable networks on the NGN road:

IPCablecom & PacketCable™ Technologies and Development Status

ITU-T NGN Workshop

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Agenda

- Introduction
- IPCablecom & PacketCable
  - PacketCable technology overview
  - IPCablecom: ITU-T SG9 and ETSI AT
- Certification Programs
  - CableLabs PacketCable Certification in N.A.
  - ECCA/ECB Certification in Europe
- Cable Operators VoIP Trials

International Collaboration on NGN over Cable

- Organizations collaborate on NGN over Cable:
  - CableLabs, ECCA, ECB, tComLabs, … with standardization efforts in ITU-T, SCTE, ETSI & IETF

- CableLabs as initiator and main contributor
- Regular contacts with ECCA and tComLabs to consider European requirements
- Involvement of vendors in each step of development
- Harmonized representation in SDOs

CableLabs

- Cable Research and Development consortium
  - Founded in 1988 as a not-for-profit organization
- CableLabs CEO Dr. R. Green, ITU-T SG9 chairman
- CEO-driven governance; CTO involvement
- CableLabs membership
  - Cable operators as members
  - 80% of North American subscribers
  - Members scattered internationally (Europe, US, Canada, …)

CableLabs Initiatives

- DOCSIS®
- CableHome™
- PacketCable™
- OpenCable™
- Bandwidth Management
- VOD Metadata
- Go2Broadband™

European Cable Communications Association (ECCA)

- Trade organization of cable operators headquartered in Brussels, Belgium
- 37 members in 21 different countries delivering broadband services to over 55 million customers
- Goals
  - encouraging the development of cable
  - ensuring information exchange among members
  - examining technical, commercial and legal matters directly or indirectly relevant to cable

IPCablecom & PacketCable Specifications

Overview in the context of NGN

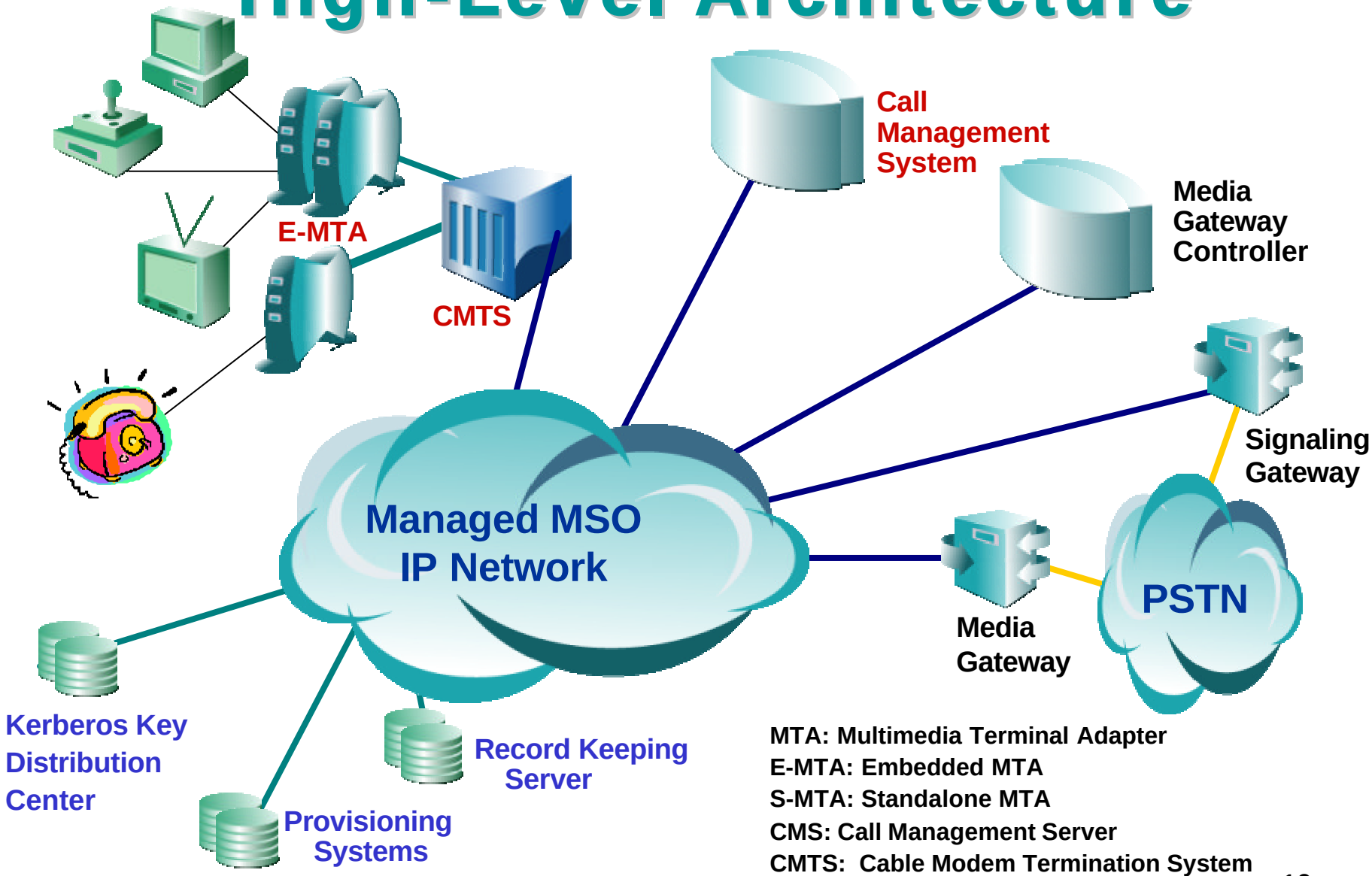
IPCablecom & PacketCable: Cable's IP Service Platform

- CableLabs PacketCable Project Objective: Develop an open architecture to manage delivery of Internet Protocol services over DOCSIS 1.1 and DOCSIS 2.0 cable networks
- Voice over IP (VoIP) remains our core focus for 2003
- Growing interest in using PacketCable to manage delivery of other services (XoIP)
  - PacketCable Multimedia: games, music, movies, video telephony, 'smart services'

Technology Advantages

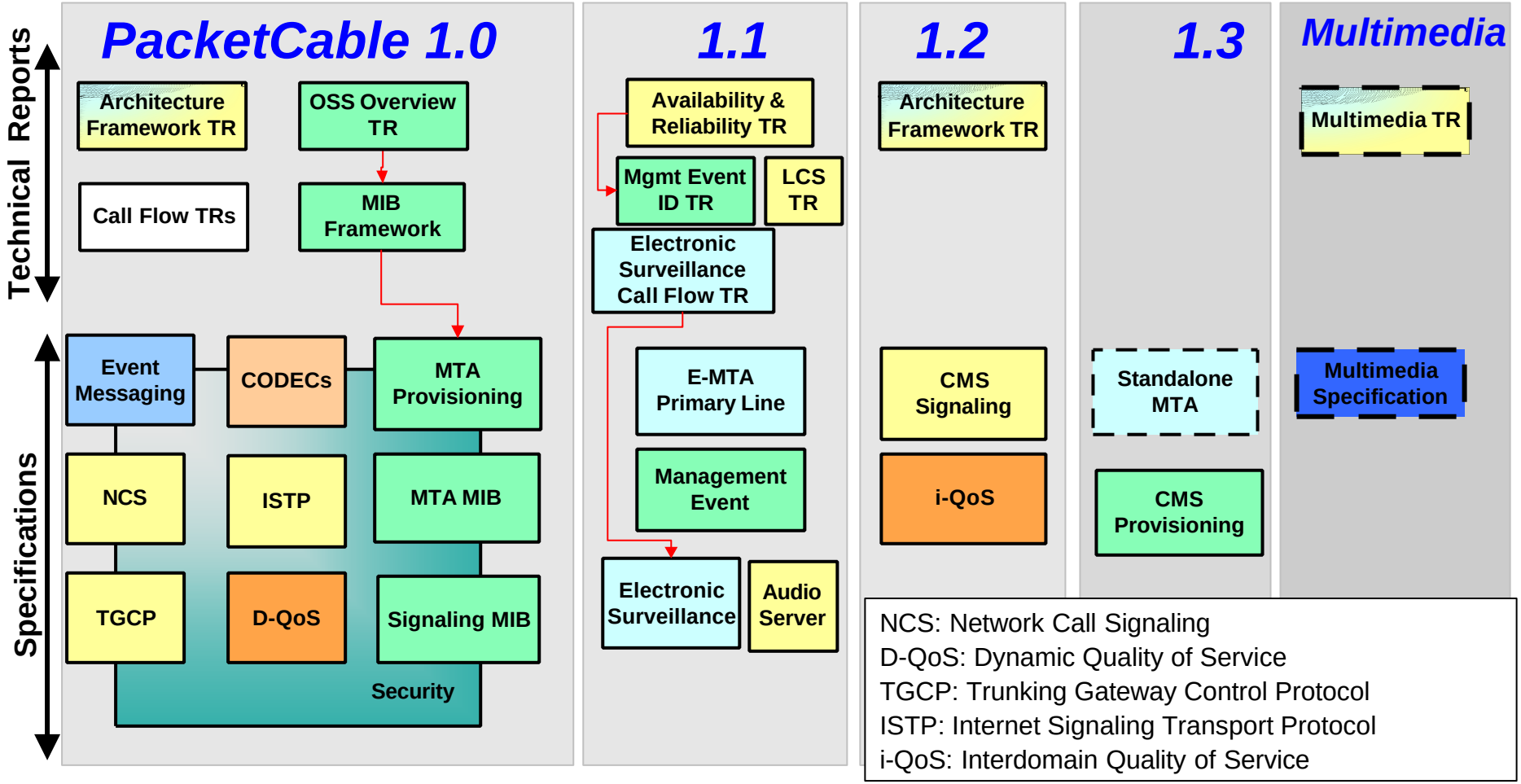
- Leverage DOCSIS 1.1 Deployments
  - Fine-grained management of bandwidth increases cable performance and efficiency of cable network
  - Support more services using same amount of bandwidth
- Scalability
  - Migration from circuit-switched telephony to PacketCable via GR-303 & V5.2 protocol
  - Software-based architecture allows for progressive deployments
- Convergence of multimedia services
  - Combine the best characteristics of real-time voice communications and Internet data applications

High-Level Architecture



MTA: Multimedia Terminal Adapter
E-MTA: Embedded MTA
S-MTA: Standalone MTA
CMS: Call Management Server
CMTS: Cable Modem Termination System

PacketCable Specifications (1)



PacketCable Specifications (2)

- PacketCable 1.0
  - Scope: Secondary line VoIP service, single-zone
  - Document maintenance & requirements refinement based on feedback from field trials & certification testing
- PacketCable 1.1
  - Scope: Primary line VoIP service, single-zone
  - Primary line MTA requirements
  - Electronic Surveillance Spec updated in Q2/Q3'03
  - Audio Server Specification for media announcements and conferencing

PacketCable Specifications (3)

- PacketCable 1.2:
  - Scope: Inter-domain Signaling and QoS, multi-zone
  - CMS Signaling (IETF SIP-based protocol) published as ISSUED in Q4'02
- PacketCable 1.3
  - Scope: Standalone MTA and CMS Subscriber Provisioning
  - CMS Provisioning published as ISSUED in Q4'02
  - S-MTA published as DRAFT 02 in Q4'02, ISSUED in Q4 '03
- PacketCable Multimedia
  - Scope: QoS-enabled Multimedia Services
  - Technical Report & Specification to be ISSUED in Q2'03

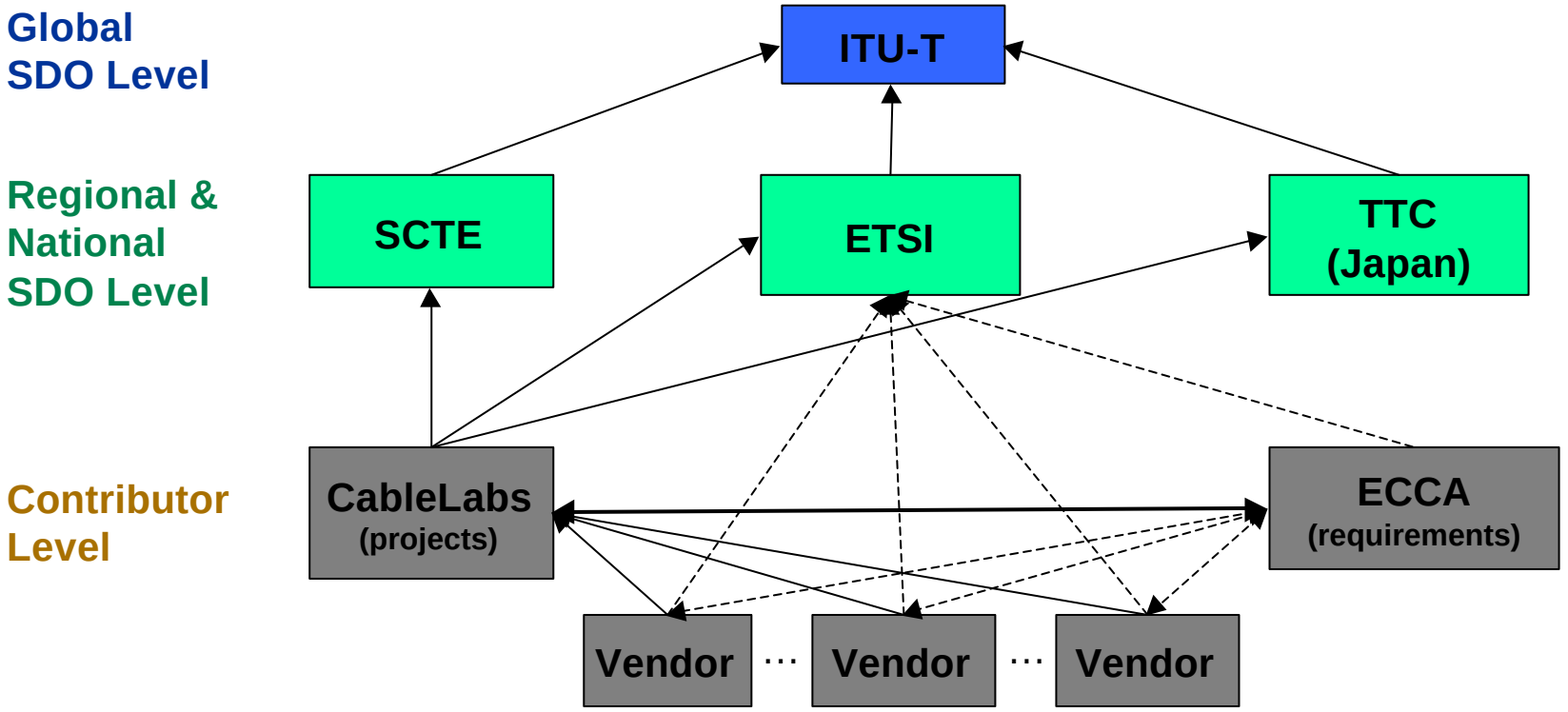
PacketCable Multimedia

- Design Objectives:
  - Support a wide range of QoS-enabled, beyond-voice services
  - Leverage existing mechanisms defined in PacketCable 1.x and DOCSIS 1.1
  - Reduce development complexity by eliminating telephony specific requirements (PSTN interconnect, telephony billing models, MTA provisioning)
- European effort with CASSIC project
  - including interface to software platform for IDTV

PacketCable Goes Global

- IPCablecom Standardization
  - North America (SCTE)
  - Europe (ETSI)
  - World-Wide (ITU-T SG9, IETF)
- 15 Recommendations approved by ITU
- IPCablecom Testing
  - North American Requirements => CableLabs
  - European Requirements => tComLabs on behalf of ECCA/ECB
  - Worldwide Requirements => Discussions under way with International Cable Operators

IPCablecom Standard Process



ECCA European Cable Communication Association
ETSI European Telecom Standards Institute
ITU-T International Telecom Union, Telecom sector
SCTE Society of Cable Telecom Engineers
SDO Standards Development Organisation (accredited)

European extensions
Standards draft text to IPR terms of recipient

IPCablecom

Approved Baseline ITU-T Recommendations

- **Architecture**
  - J.160 Architecture
  - J.173 Embedded MTA primary line support
- **Signaling**
  - J.162 Network Call Signalling
  - J.165 IP Sig. Transport Protocol
  - J.171 Trunk Gateway Control Protocol
- **Quality of Service**
  - J.163 Dynamic QoS
  - J.174 Inter-Domain QoS
- **Media/Codecs**
  - J.161 Audio Codec requirements
- **OSS**
  - J.164 Event messaging
  - J.166 MIB Framework
  - J.167 MTA provisioning
  - J.168 MTA MIB
  - J.169 NCS MIB
  - J.172 Management Event mechanism
- **Security**
  - J.170 Security

IETF Standardization in IPCDN

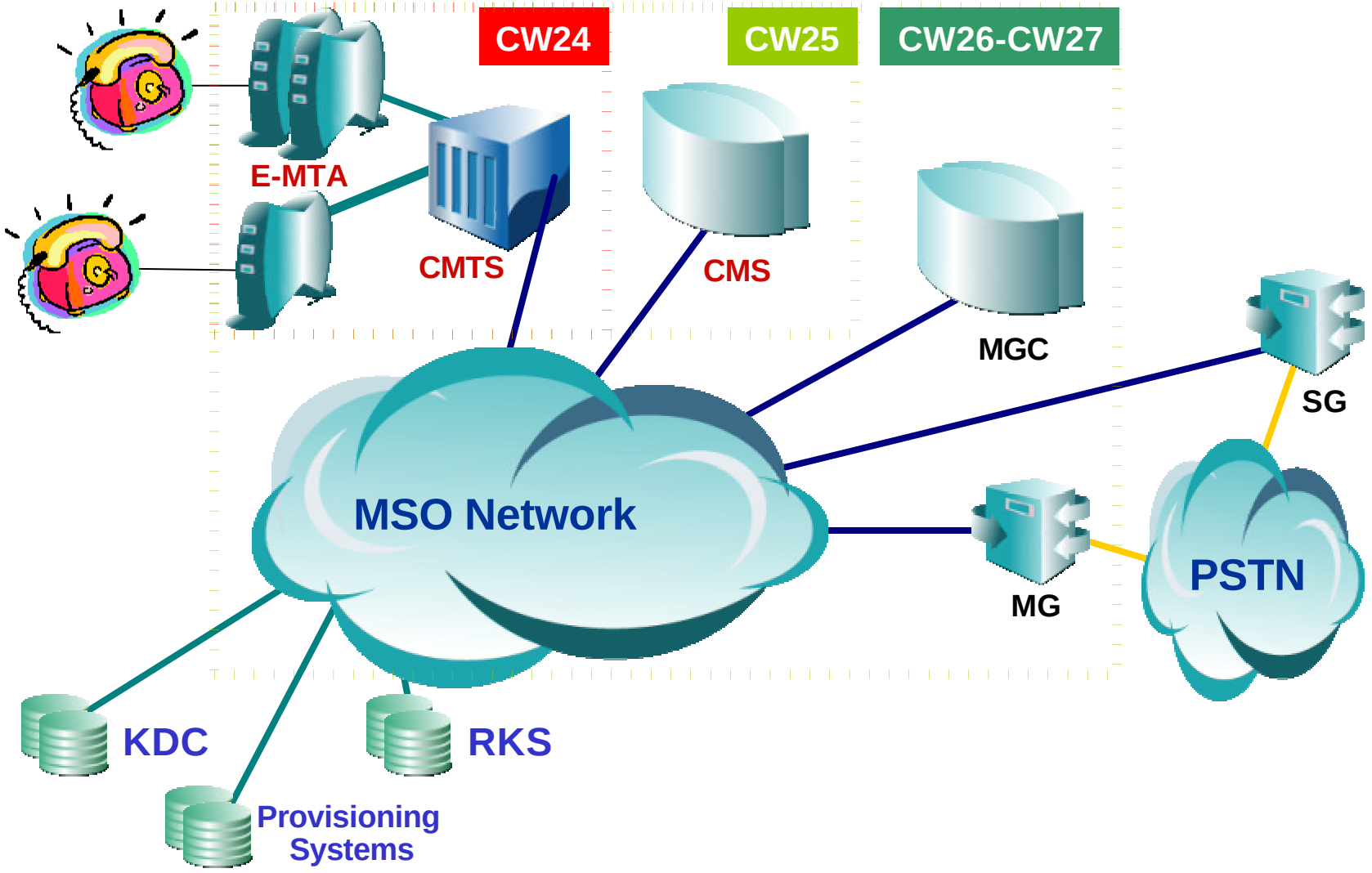
- IETF IPCDN:IP over Cable Data Network
  - IETF Working Group in Internet Area
  - Develop and standardize SNMP MIBs for IP-capable data-over-cable systems
    - DOCSIS MIBs for Cable Device (RFC 2669), Baseline Privacy Plus (BPI+), Event Notification, RF MIB, QoS, Subscriber Management
    - PacketCable MIBs for MTA device, Signaling and Event Management MIB
    - CableHome MIBs for Address Mapping, Configuration, Gateway Device, QoS, Remote Diagnostic Tools
- Co-chairs:
  Rich Woundy (Comcast), JF Mulé (CableLabs)

Certification Programs

2003 PacketCable Objectives Testing and Interoperability

- Conduct 3 Certification Waves
  - Test core access network components (E-MTA, CMTS, CMS)
  - Test new head-end gateway components (MG, MGC)
  - Test new functionality (CALEA, CMSS, voice codecs)
  - Augment interface with greater system-level tests to help vendors narrow the gap between specification compliance and real-world interoperability
- Adapt certification to product innovation
- Certification Waves 24 & 25 Results
  - 4 E-MTAs Certified: Arris (2), Motorola, Toshiba
  - 5 CMTSs Qualified: Arris, Cisco (2), Motorola, Terayon
  - 2 CMSs Qualified: Cisco, Syndeo

2003 Certification Waves



European Certification (1)

- ECCA led initiative to establish certification process for PacketCable in Europe
- Leverage the evolution of the Euro-DOCSIS Certification Board (ECB)
  - members are major European operators
  - well-recognized for managing Euro-DOCSIS Certification Program among operators and vendors
  - high-quality testing facilities established at tComLabs
  - experience in performing test waves in close cooperation with CableLabs

European Certification (2)

- tComLabs chosen to prepare for Euro-PacketCable Certification
- Several (extended) interoperability events with large vendor participation
- CW13 starting October '03 first to include Euro-PacketCable testing
- Additional European specific requirements tested
  - focus on access network interfaces
  - significant interest of operators for intermediate architecture based on V5.2 => add'l certification test plan
  - aim to extension towards stand-alone MTA

Cable Operator VoIP Trials

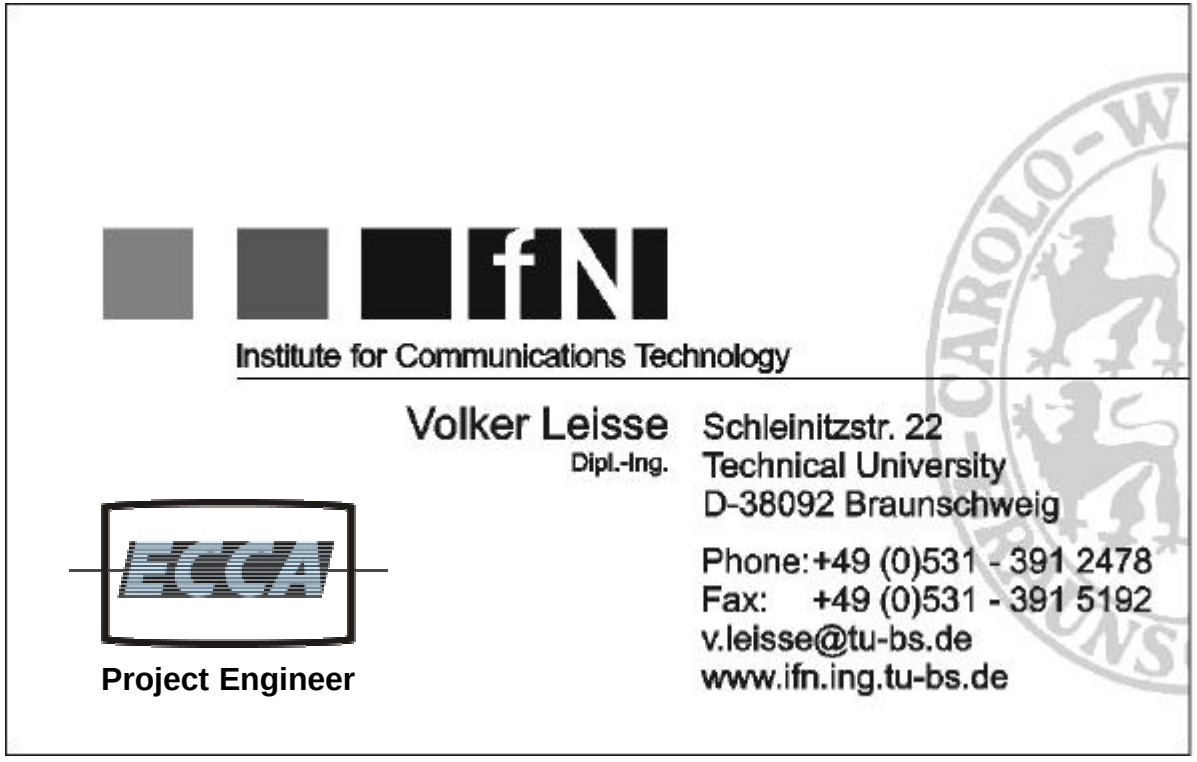
VoIP Trials in North America

- Service Launch: Time Warner, Portland, ME
- Technical Trials
  - Comcast:
    Detroit, MI and Philadelphia, PA
  - Charter Communications:
    St. Louis, MO & Stevens Point, WI
  - Time Warner:
    Rochester, NY
  - Liberty Cablevision: Puerto Rico
- Additional Commercial Deployments planned for Q3-Q4 '03 and in 2004

VoIP Roadmap in Europe

- Essent Kabelcom, **Netherlands**: successful technical trial, pilot deployment with 500 customers in Dec 2003, commercial rollout expected in Q1 2004
- **Switzerland**: 'consumer test launch' by Cablecom, expected country-wide deployment by end of 2004
- TDC Kabel TV, **Denmark**: deployment dependent on product availability, technical trials in Q4 2003 and Q1 2004, solid solution expected in Q3 2004
- FT Cable, **France**: focus on multimedia services exploiting broadband access

Thank You.



Thank You.