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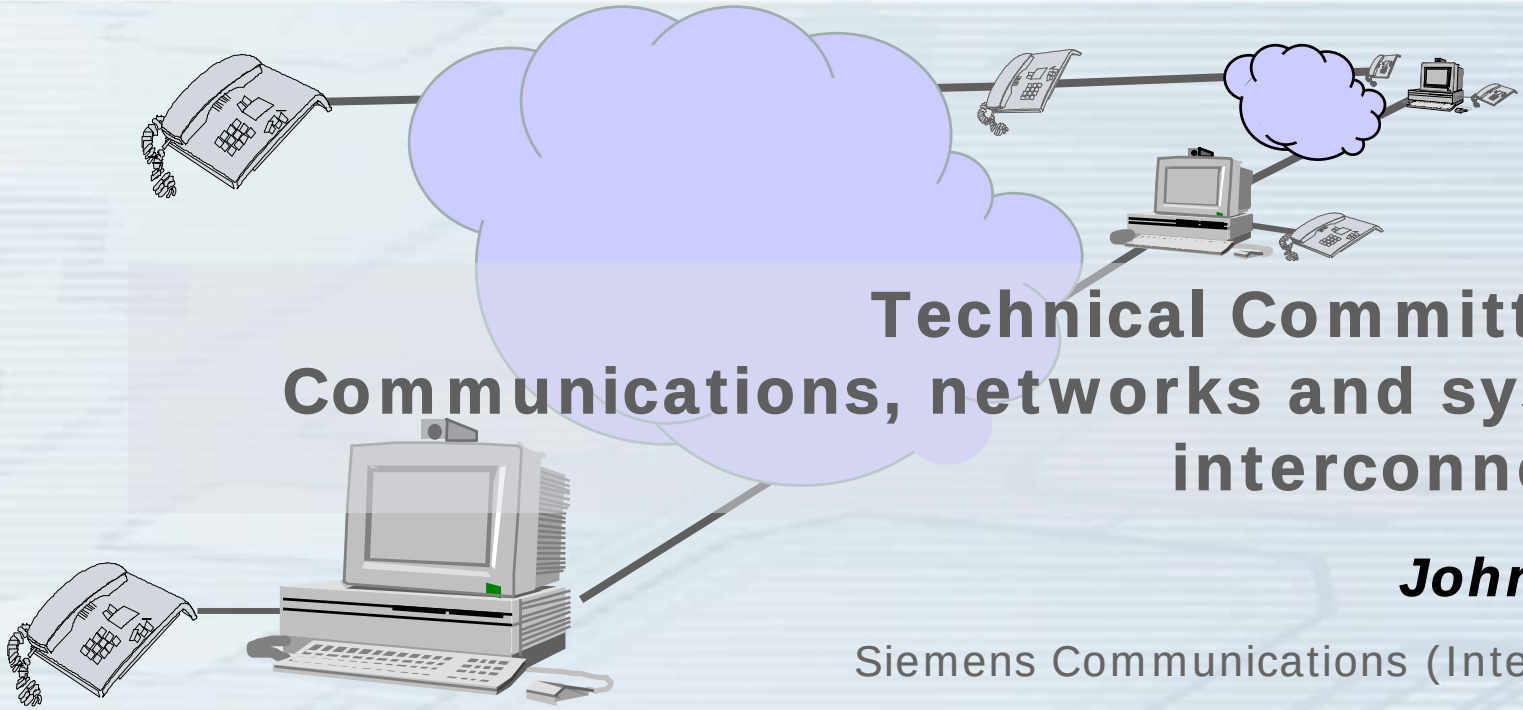

Technical Committee 32
Communications, networks and systems interconnection

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Structure of presentation

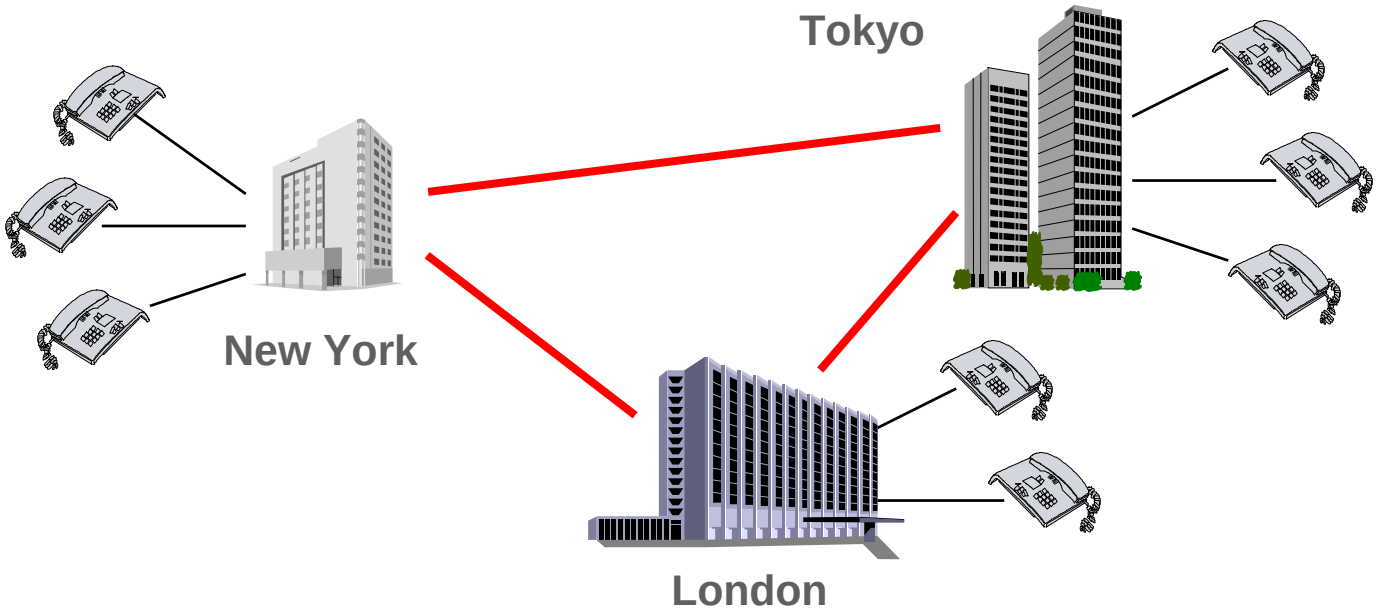
Background to Corporate Telecommunication Networks

Key technologies standardized by TC32

- *Private Integrated Services Networks (PISNs), including QSIG*
- *Computer-Supported Telecommunications Applications (CSTA)*
- *Broadband PISNs*
- *PISN-IP interoperability*

TC32 today - Task Groups, working methods, relationship with JTC1 and ETSI

Corporate Telecommunication Networks



Serving a defined set of users - not the general public

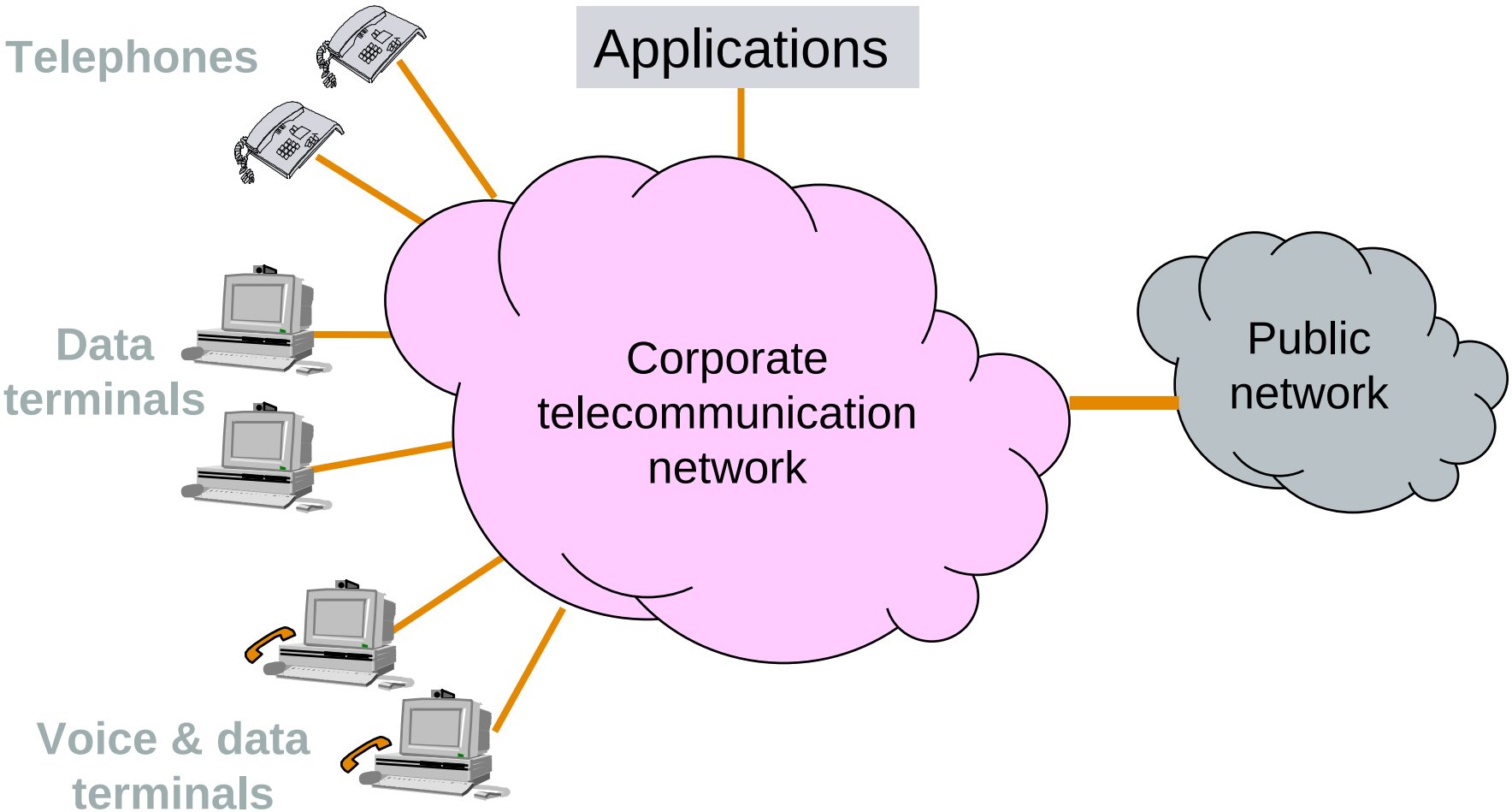
Traditionally for voice - built around PBXs

Alternatively can use public network infrastructure - Virtual Private Networks (VPNs) or hosted Service Provisioning

Recent years have seen start of convergence with data:

- *convergence of **applications***
  - **e.g. data applications that control voice calls, integrated mailboxes and directories**
- *convergence of **desktop***
  - **1 terminal for data and voice**
- *convergence of **network infrastructure***
  - **1 network for data and voice - IP**

Corporate telecommunication networks



Private Integrated Services Networks - PISNs

Based on Integrated Services Digital Network (ISDN) technology (as defined by ITU-T)

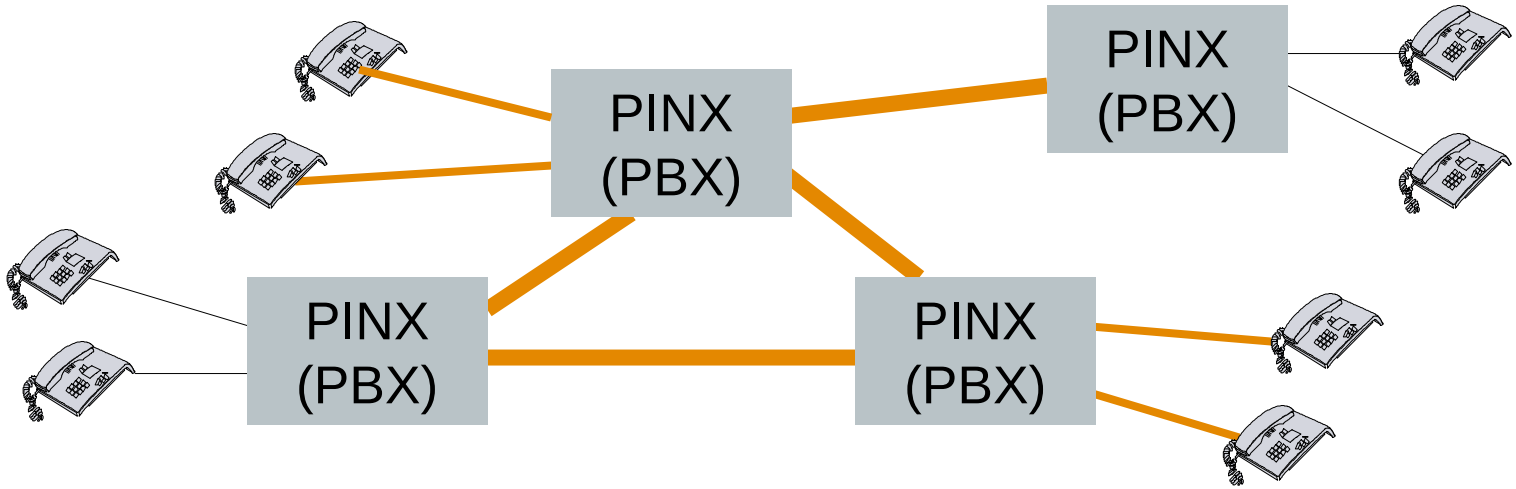
- *Time division multiplexing (TDM)*
- *64 Kbit/s pipes*
- *Voice normally encoded using G.711*
- *Common channel signalling*

Nodal entity known as Private Integrated services Network eXchange (PINX)

ISDN technology took over from analogue technology and digital channel-associated technology in corporate telecommunication networks in mid to late 80s

Can carry data as well as voice, but not efficient

Implementing PISNs



Typically implemented using customer premises equipment, i.e. Private Branch eXchanges (PBXs)

Can be implemented on public ISDN infrastructure as VPN, or a combination of leased lines, public ISDN equipment and customer premises equipment

PISNs - Inter-PINX signalling

Need for a signalling protocol for controlling the establishment, maintenance and clearing of calls between PINXs

Initially carried out by proprietary protocols - also DPNSS in UK

Need for an internationally standardized protocol to permit multi-vendor operation in multi-national corporate networks

TC32 began work on QSIG (also known in ISO/IEC as PSS1) in 1988

QSIG - Signalling at the Q reference point

Q reference point is logical interface from a PINX to a peer PINX

- *a number of 64 Kbit/s user information channels*
- *a common signalling channel*

Independent of how the inter-PINX link is realized, e.g., leased line, via public ISDN, via IP network

PISNs - QSIG standards

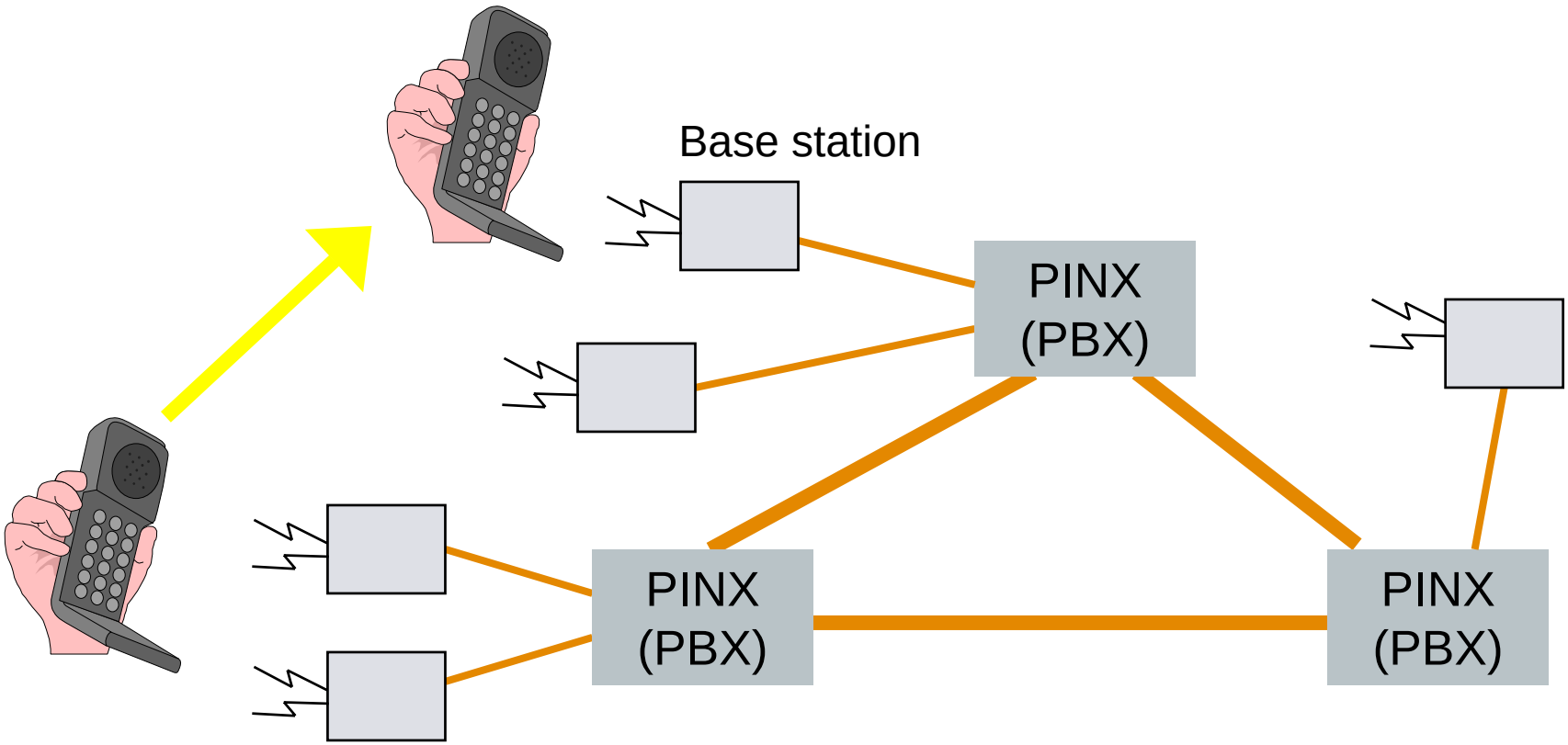
ECMA-143 - QSIG basic call (ISO/IEC 11572)

ECMA-165 - QSIG generic support for supplementary services - a toolkit on which signalling for support of supplementary services can easily be built (ISO/IEC 11582)

Ecma Standards for QSIG support for individual supplementary services / additional network features, e.g., call transfer, call diversion, advice of charge, caller's name, short message service, message centre support, etc.

Ecma Standards describing basic and supplementary services (providing requirements for the corresponding QSIG standards)

PISNs -Wireless Terminal Mobility (WTM) support in QSIG



PISNs - Wireless Terminal Mobility (WTM) support in QSIG

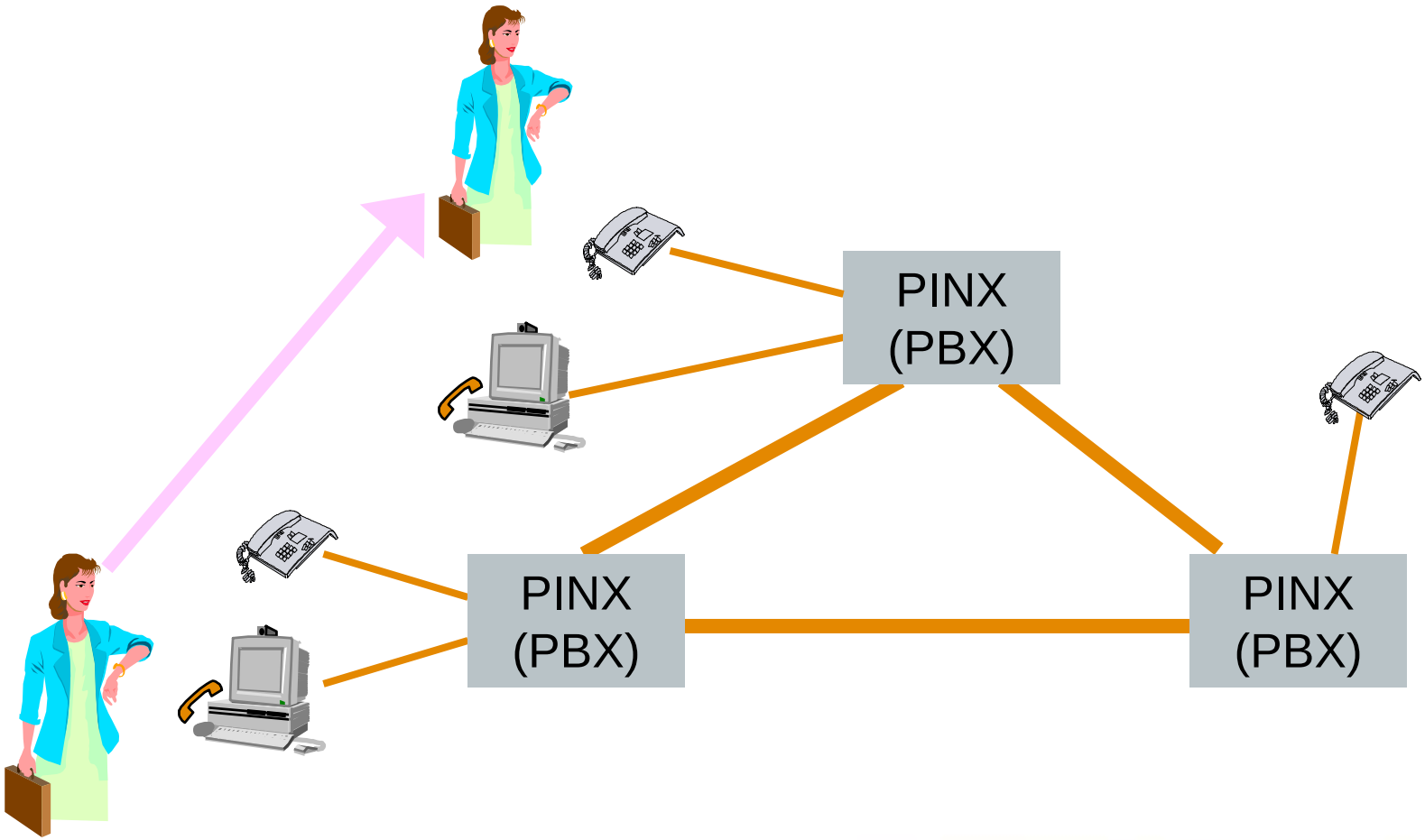
Formerly CTM (Cordless Terminal Mobility)

Air interface independent, but typically using the DECT (Digital Enhanced Cordless Terminal) air interface standard

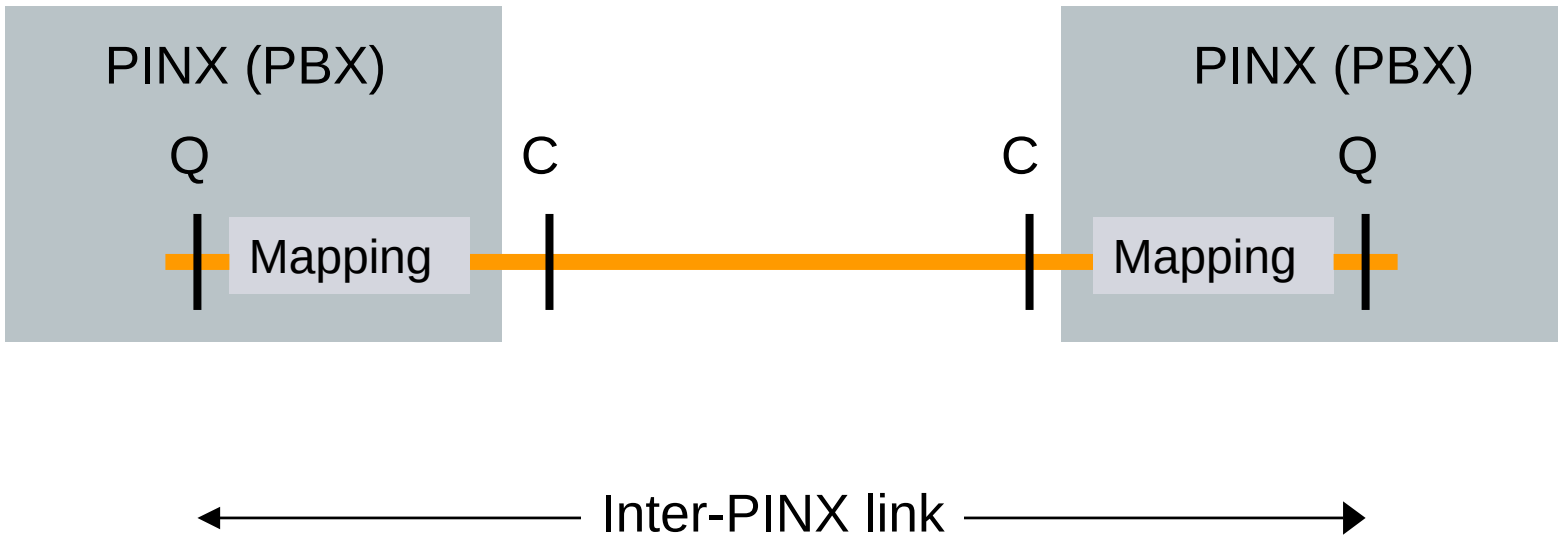
QSIG support for

- *location registration*
- *incoming call*
- *outgoing call*
- *terminal authentication*
- *network authentication.*

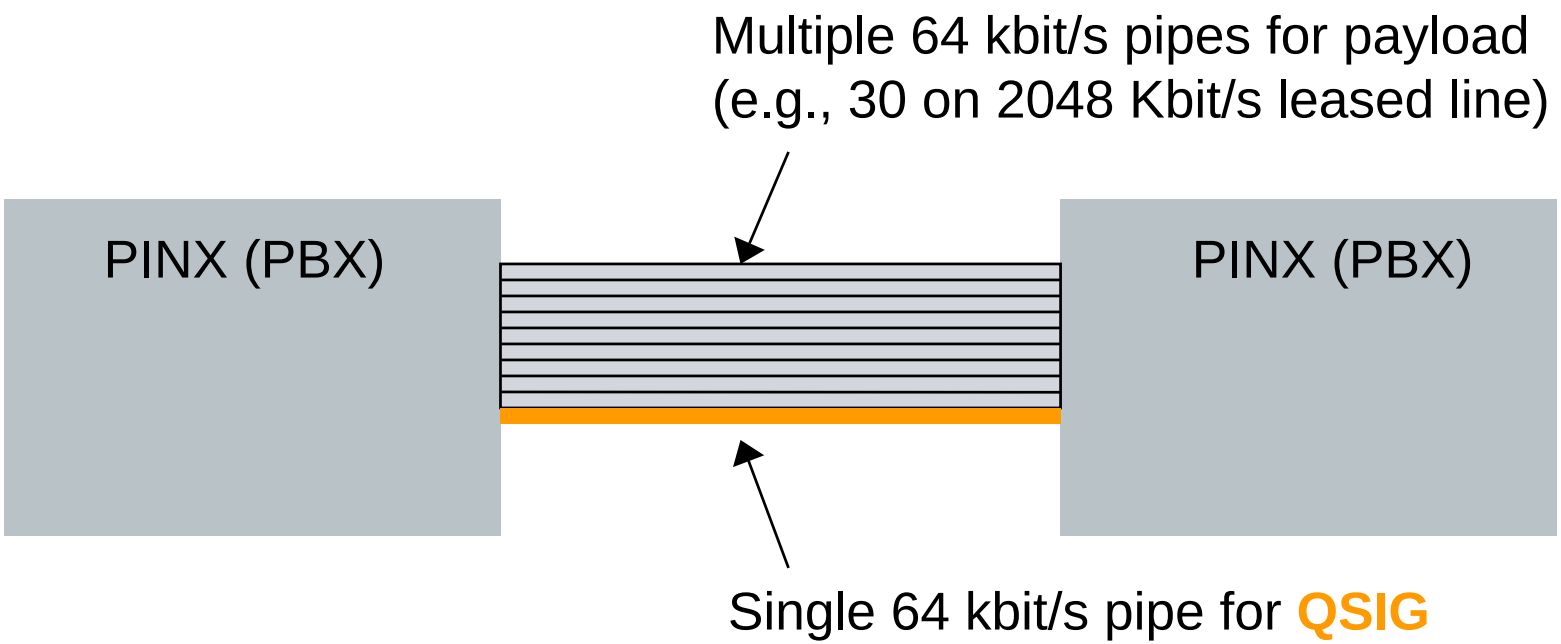
PISNs - Personal User Mobility (PUM) support in QSIG



PISNs – a means of providing inter-PINX links

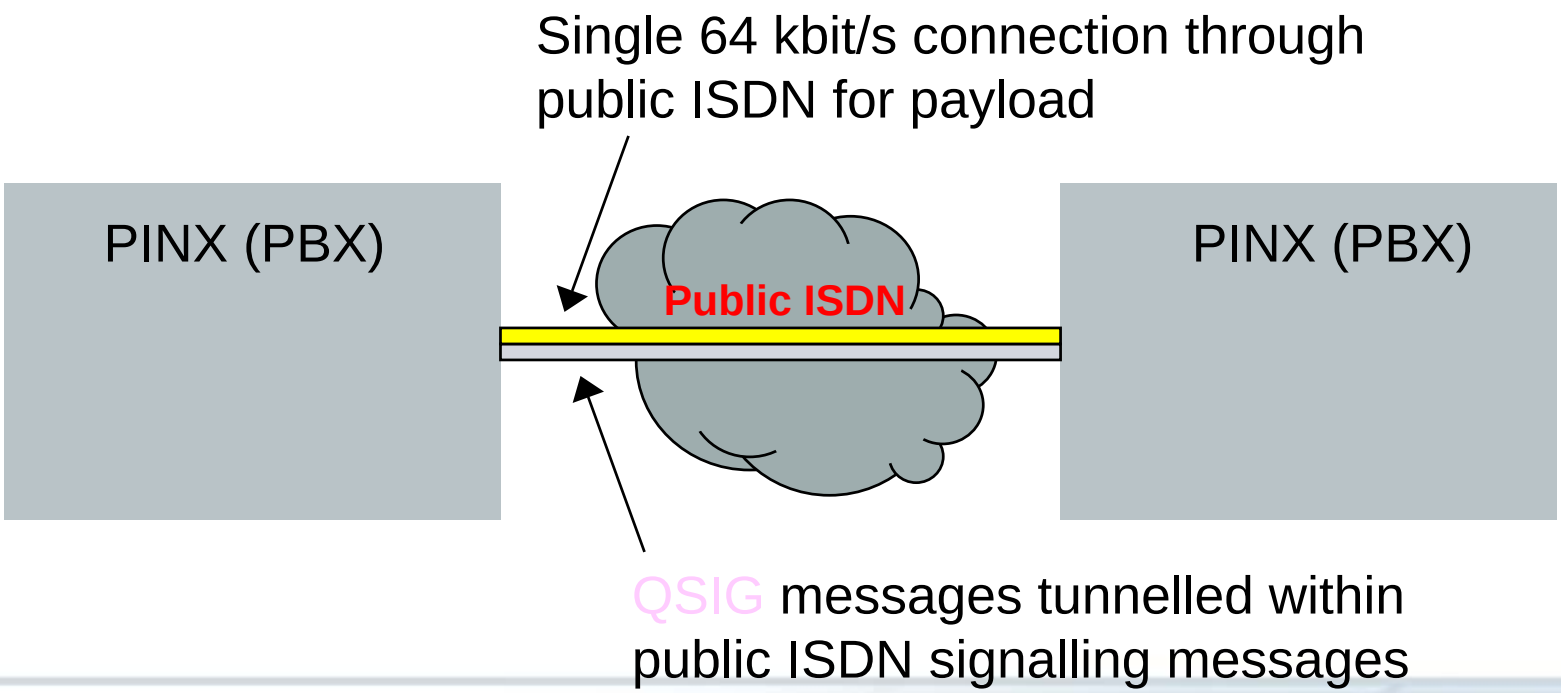


ECMA-226 - Mapping circuit mode - for leased lines or use of public ISDN connections with separate 64 Kbit/s connection for QSIG



PISNs - Mapping standards (2)

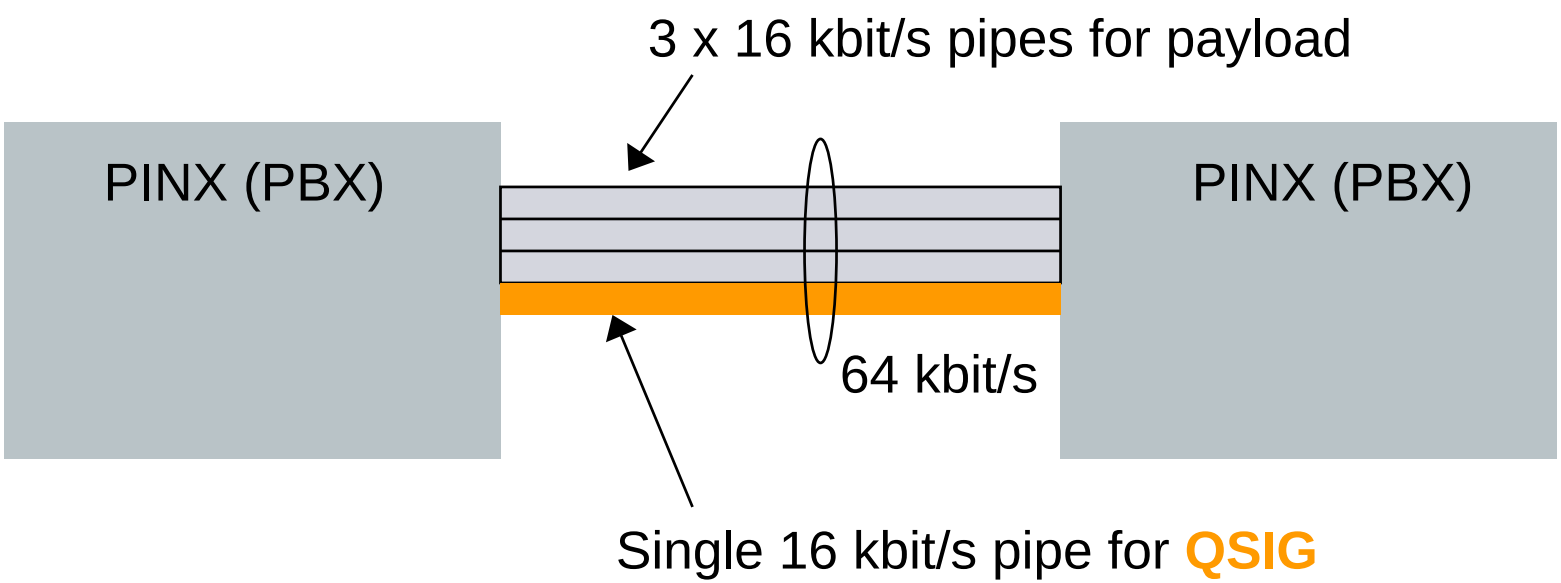
ECMA-244 - Mapping user-user signalling - uses single public ISDN connection, with QSIG tunnelled within ISDN signalling as “user-to-user” information



PISNs - Mapping standards (3)

ECMA-253 - Mapping 16 Kbit/s - uses single 64 Kbit/s connection to provide:

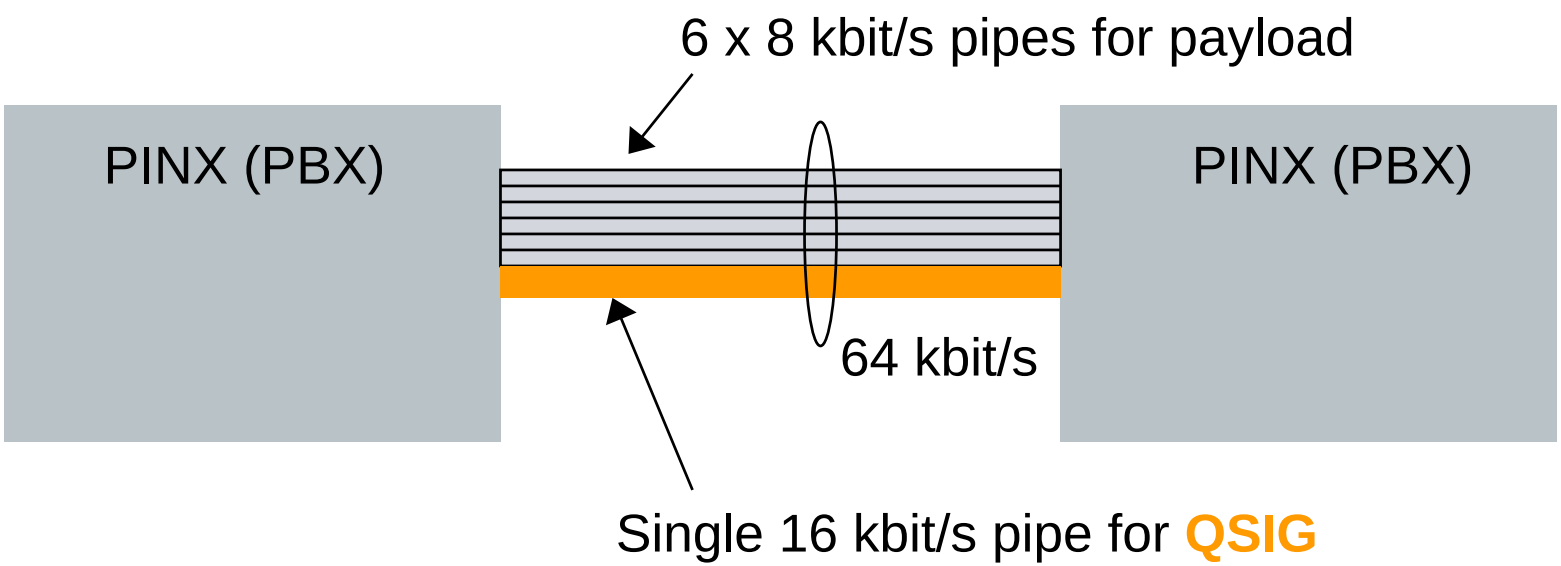
- *3 x 16 Kbit/s user information channels (for compressed speech)*
- *1 x 16 Kbit/s signalling channel for **QSIG***



PISNs - Mapping standards (4)

ECMA-289 - Mapping 6 x 8 Kbit/s - uses single 64 Kbit/s connection to provide:

- *6 x 16 Kbit/s user information channels (for compressed speech)*
- *1 x 16 Kbit/s signalling channel for **QSIG***



PISNs - other Ecma Standards

ECMA-133 - reference configuration

ECMA-155 - addressing and numbering in PISNs

ECMA-312 - QSIG profile for air traffic systems

ECMA-318 - QSIG profile for VPN access

PISNs - current status of QSIG

The internationally accepted standard for **inter-PINX** signalling

Published also as **ISO/IEC International Standards**

Endorsed by **ETSI** as **European Norms (EN)**

Implemented by **all major PBX vendors**

The basis for some **VPN implementations**

What is CSTA?

Abstraction Layer for telecommunication applications:

- *Independent of underlying signaling protocols*
  - **H.323, SIP, Analog, T1, ISDN, etc.**
- *Independent of devices*
  - **intelligent endpoints, low-function/stimulus devices, SIP Signaling models - 3PCC vs. Peer/Peer**

Operates equally well in different environments:

- *3rd party call control*
- *1st party call control*

Basic call model standardized in 1992 – continually refined and enhanced based upon significant industry implementation experiences, new protocols, etc.

Design goal to enhance application portability across CSTA implementations:

- *Specifies normalized call model and behavior*
- *Complete functional definition of each service*
- *Specific conformance criteria*

Standardized CSTA Features

26 Call Control features (making call, answering call, etc.)

6 Call Associated features (sending user data, etc.)

19 Logical Device features (do not disturb, forwarding, etc.)

23 Physical Device features (writing to device display, etc.)

5 Capability Exchange features (feature discovery, etc.)

4 Snapshot features (query existing calls at a device, etc.)

3 Monitor features (subscribing to event reports, etc.)

17 Voice Services (for Listener, DTMF, Prompt and message resources)

Other: Routing services, Media Attachment services, Maintenance services, Data Collection services, Accounting services, etc.

Implementation does not need to support all of these features to conform to CSTA!!!! (See Slide 12 on Profiles)

Recent speech enhancements for CSTA (ECMA-269, 6th edition)

Speech service enhancements to CSTA

- *For speech recognition/verification*
- *For speaker recognition/verification*
- *For text to speech synthesis*
- *For distributed speech services using:*
  - **ECMA-323 over SIP or TCP/IP**
  - **ECMA-348 for Web Services**
- *Added speech resources to CSTA:*
  - **Listener, Prompt, Prompt-Queue, DTMF, Message and Generic**
- *Added Interactive Speech Devices to CSTA*
  - **Enables seamless integration of speech and call control**

CSTA publications 1/2

Document Title	Ecma Publication	ISO/IEC Publication	ETSI Publication
Services for CSTA Phase III	ECMA-269	ISO/IEC 18051	ETSI TS 102 173
ASN.1 Protocol for CSTA Phase III	ECMA-285	ISO/IEC 18052	
XML Protocol for CSTA Phase III	ECMA-323	ISO/IEC 18056	ETSI TS 102 174
Web Services Description Language (WSDL) for CSTA Phase III	ECMA-348		
Definitions & Terms for CSTA Ph. III	ECMA TR/72	ISO/IEC TR 18053	
Migrating to CSTA Phase III	ECMA TR/80		
Scenarios for CSTA Phase III	ECMA TR/82		
Using Ecma-323 (CSTA XML) in a Voice Browser Environment	ECMA TR/85	ISO/IEC TR 18057	ETSI TR 102 171
Using CSTA for SIP Phone User Agents (uaCSTA)	ECMA TR/87	ISO/IEC TR 22767	ETSI TR 102 348
Designing an Object Model for ECMA-269 (CSTA)	ECMA TR/88		

CSTA publications 2/2

Document Title	Ecma Publication	ISO/IEC Publication	ETSI Publication
Application Session Services (used in ECMA-269)	ECMA-354	ISO/IEC 22534	ETSI TS 102 344
WS-Session – (WSDL for ECMA-354)	ECMA-366	ISO/IEC 25437	ETSI TS 102 440
Session Management, Event Notification, and Computing Function Services - Amendments for ECMA-348	ECMA TR/90		

Summary

CSTA is an existing (Ecma, ETSI, ISO) Standard with an exhaustive feature set, comprehensive call model

CSTA supports range of application landscapes – from basic 1st party call control to advanced 3rd party call control with same standardized model

CSTA exposes advanced features of a communications platform to applications developers while insulating applications from underlying protocol specifics

CSTA XML facilitates use of call control features by Internet developers – when combined with Scripting languages such as ECMAScript, it becomes easy to program directly to the CSTA XML interface

CSTA XML ideally suited for VB platforms that support a messaging interface w/ asynchronous events (such as SALT smex); supports advanced Interactive Voice applications

CSTA supports voice and non-voice interactions (Email, Chat, IM, etc.) with the same call model.

CSTA complements SIP and enables developers to provide advanced features

CSTA Object Model TR provides a robust and current access method for CSTA

Broadband Private Integrated Services Networks (B-PISN)

PISNs that use **Asynchronous Transfer Mode (ATM)** instead of Time Division Multiplexing (TDM)

Fixed cell size (48 byte payload + 5 byte header) allows high speed switching

Different traffic classes - allows **mixing of data / voice / video**

B-QSIG standards developed by merger of **QSIG** and ATM Forum signalling concepts

Re-positioning of ATM with respect to IP in the market has removed the need to develop the **B-QSIG** series of standards further

PISN-IP interoperability - IP telephony in the corporate network

Internet Protocol (IP) becoming the universal layer 3 in data networks

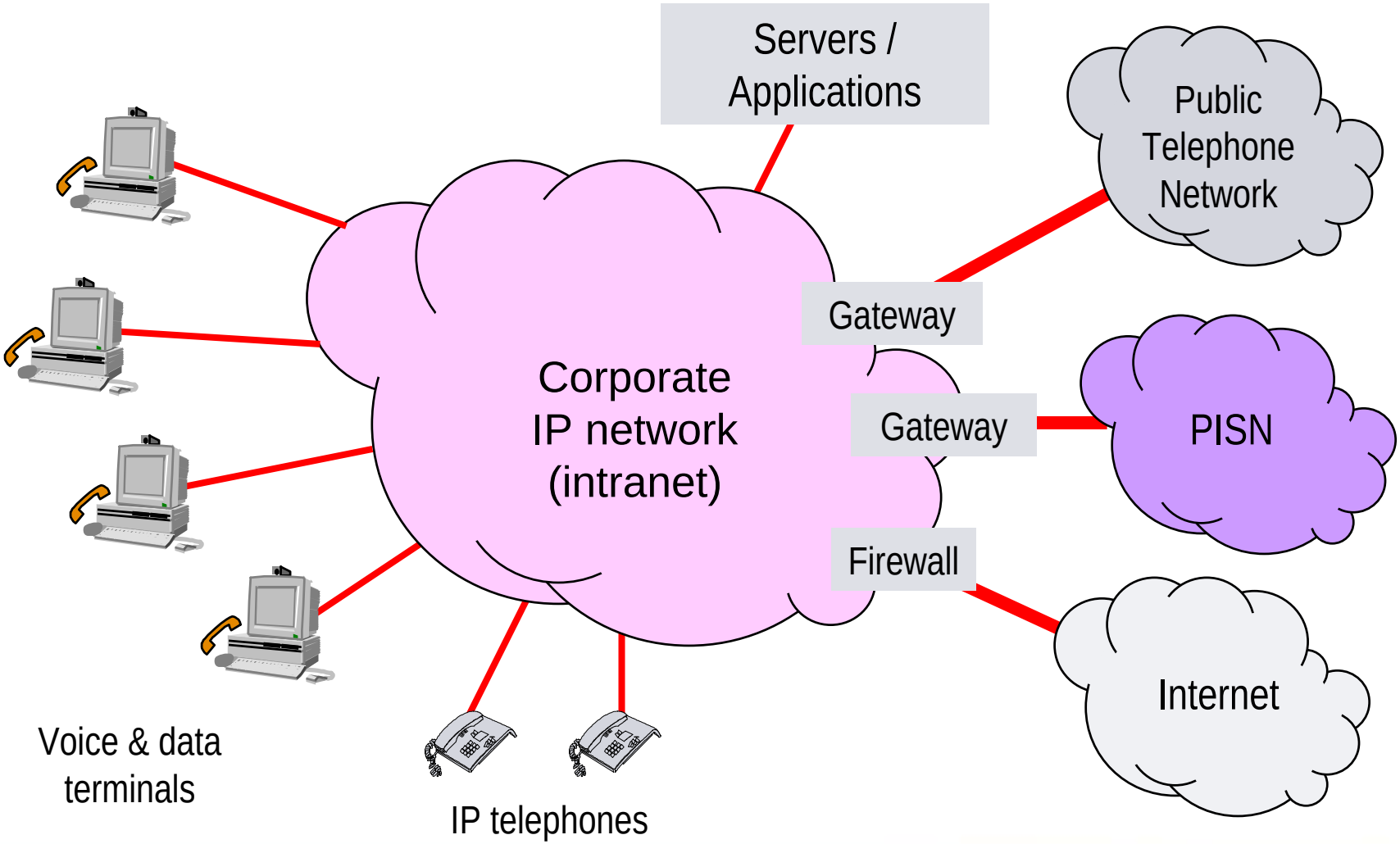
Data bandwidth increasing rapidly - already overtaking voice bandwidth

In a few years, voice bandwidth will become almost insignificant compared with data bandwidth

So, put voice on to data (IP) networks :

- *one network infrastructure to manage*
- *one cable to the desktop*
- *facilitates convergence of the desktop - use PC for voice as well as data*
- *facilitates applications convergence*

PISN-IP interoperability - IP telephony in the corporate network



Current status of IP telephony in the corporate network

Manufacturers offering two types of product:

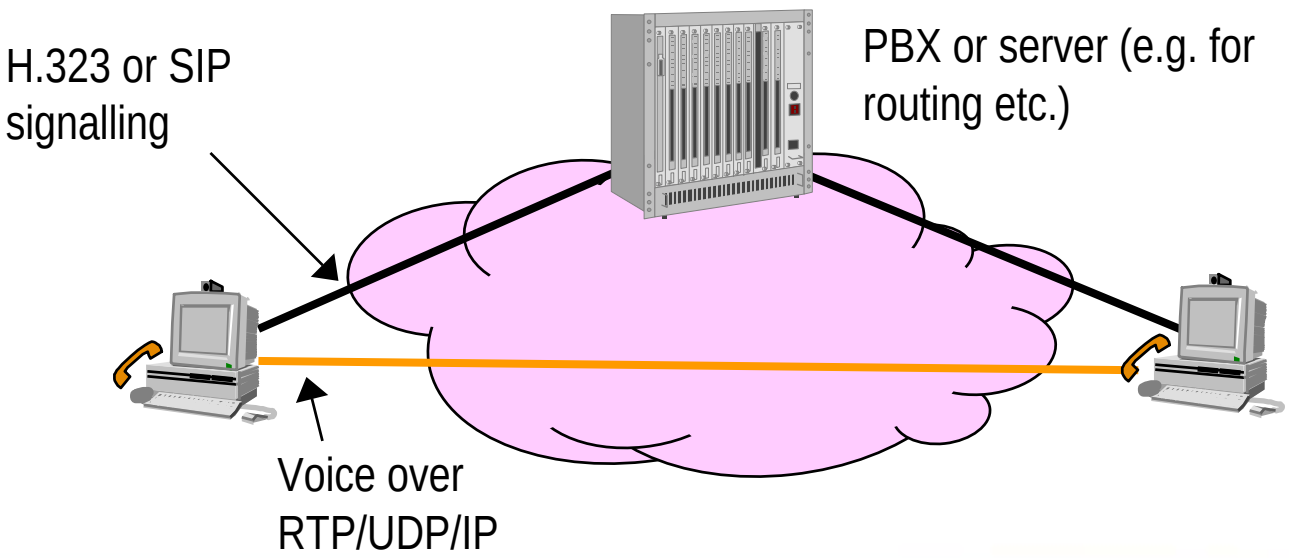
- *Evolution of the PBX - addition of IP interfaces - finding favour with large networks*
- *Server-based "soft" PBXs - finding favour with green-field sites and SMEs*

Voice QoS problems are now largely solved with increased bandwidth, network QoS support and improved handling in endsystems

Voice carried over RTP (Real-time Transport Protocol) over UDP / IP

Competing signalling standards from ITU-T and IETF

- *H.323 from ITU-T*
- *SIP (Session Initiation Protocol) and other protocols from IETF*



PISN-IP interoperability - standards for IP telephony

Signalling standards equally applicable to public and enterprise environments

ETSI's former project TIPHON looked at interworking between IP networks and switched-circuit telephony networks - but with emphasis on public networks

TC32-TG17 therefore looking at PISN-IP interoperability, i.e. enterprise networks

PISN-IP interoperability - scope of TC32-TG17 work

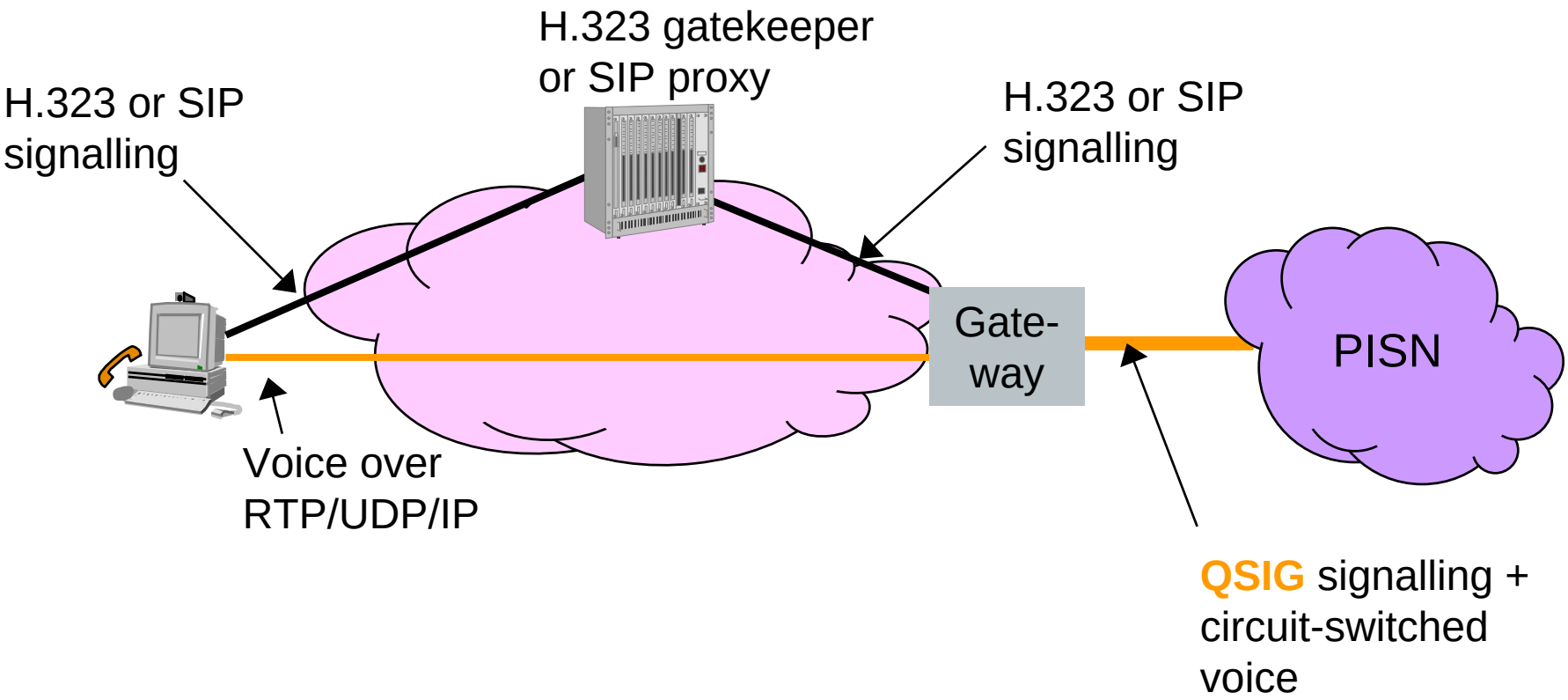
Interworking via a gateway between a PISN and an IP network

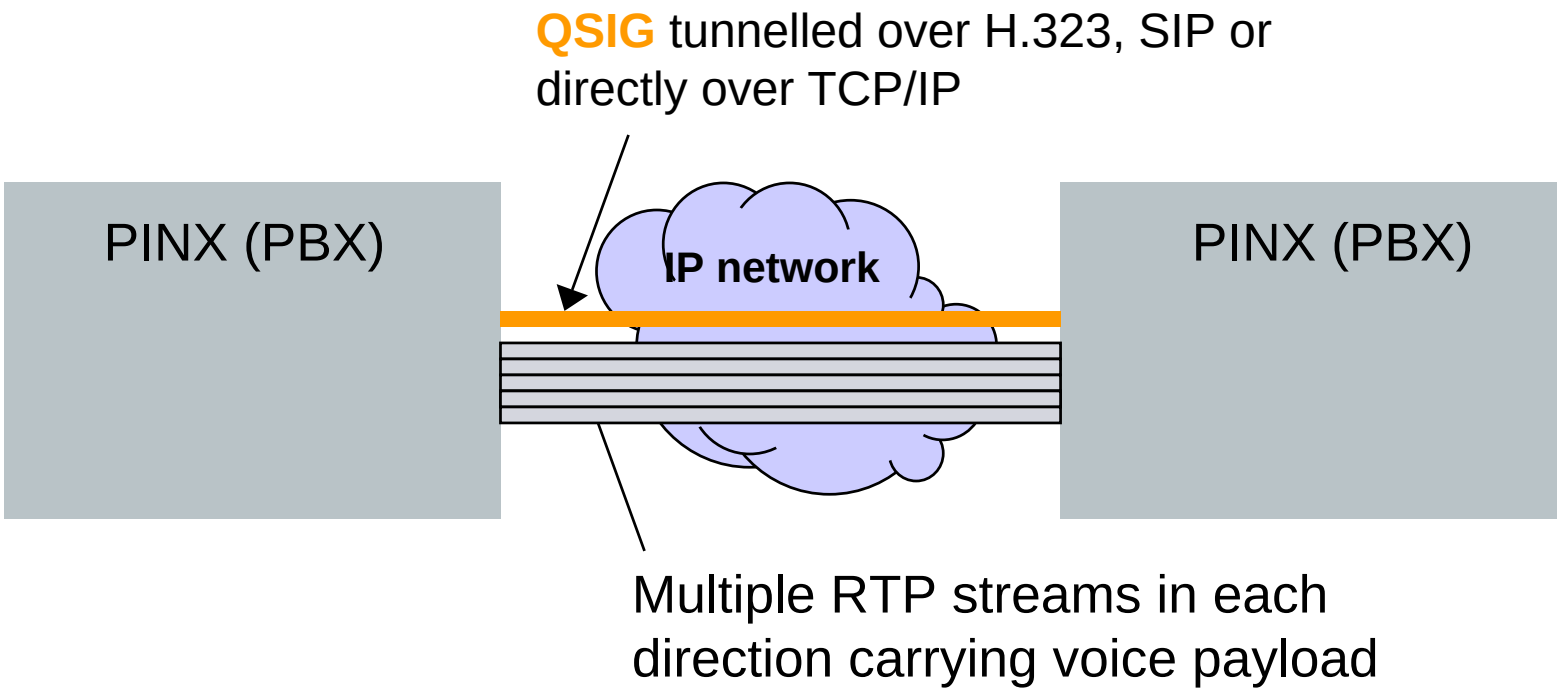
Interconnection of remote PISNs (or parts of a PISN) via an IP network

Aspects include:

- *Architecture*
- *Protocols*
- *Services*
- *Naming and addressing*
- *Security*
- *Mobility*
- *Network management*

PISN-IP interoperability - interworking between QSIG and H.323 or SIP




QSIG tunnelled over H.323, SIP or directly over TCP/IP
PINX (PBX)
IP network
PINX (PBX)
Multiple RTP streams in each direction carrying voice payload

PISN-IP interoperability - publications to date

Interworking between QSIG and H.323

- *ECMA-332 - basic call*
- *ECMA-307 - generic support for supplementary services*
- *ECMA-308 - call transfer supplementary services*
- *ECMA-309 - call diversion supplementary services*
- *ECMA-326 - call completion supplementary services*

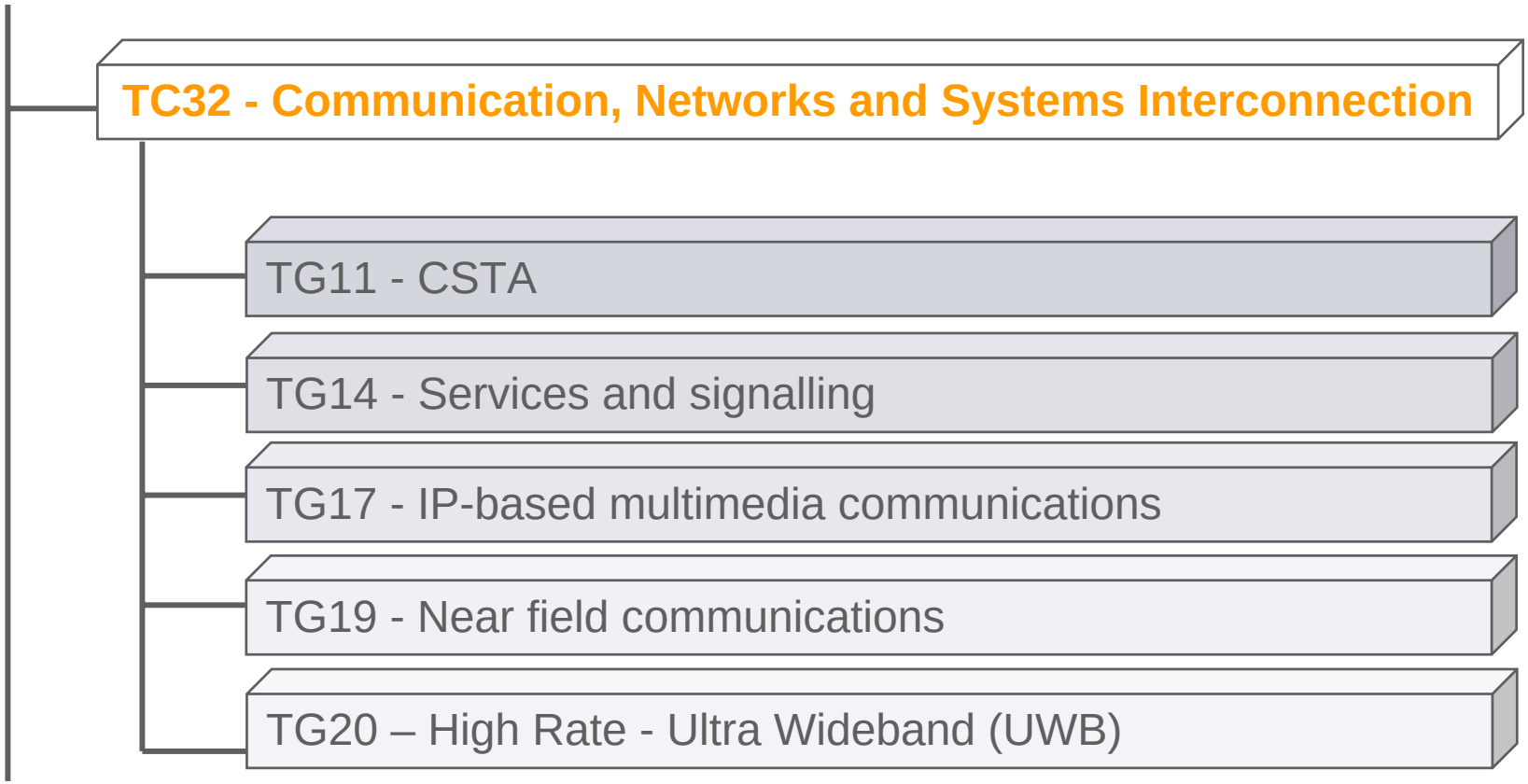
Interworking between QSIG and SIP

- *ECMA-339 - basic call*
- *work in progress on call transfer and call diversion services*

Tunnelling of QSIG over IP (for PBX interconnection)

- *ECMA-333 - tunnelling of **QSIG** over H.323*
- *ECMA-336 - tunnelling of **QSIG** directly over TCP/IP*
- *ECMA-355 - tunnelling of **QSIG** over SIP*

TC32 today Structure



CSTA phase 3 mature

Planned:

- *Object Model TR and Standard development*
- *CSTA Enhancements*
  - **SIP support**
  - **Advanced conferencing**
  - **Location aware services for mobility applications**
  - **Advanced Speech interaction**

Continuing to maintain QSIG including supplementary services and network features, if necessary.

TC32 today
TG17 (Multimedia over IP)

Interworking between QSIG and SIP

Tunnelling QSIG over SIP

Call Transfer and Call Diversion supplementary services in a QSIG/SIP environment

Working in cooperation with the IETF

Investigations into Next Generation Networks (NGN) in an enterprise environment

- *architecture,*
- *APIs,*
- *mobility, etc.*

TG19 (Near Field Communication)

Wireless communication around 13.56 MHz for interconnection of peripherals and computers at distances of a few centimetres

Active and passive modes

ECMA-340, NFCIP-1, December 2002, defines interface and protocol

ECMA-352, NFCIP-2, December 2003, defines a standardized gateway between NFCIP-1 and two other RFID standards on 13,56MHz

ECMA-356, June 2004, RF Interface Test Methods for NFCIP-1

ECMA-362, December 2005, NFCIP-1 - Protocol Test Methods

The draft wire interface standard is under development

High Rate Ultra Wideband (UWB)

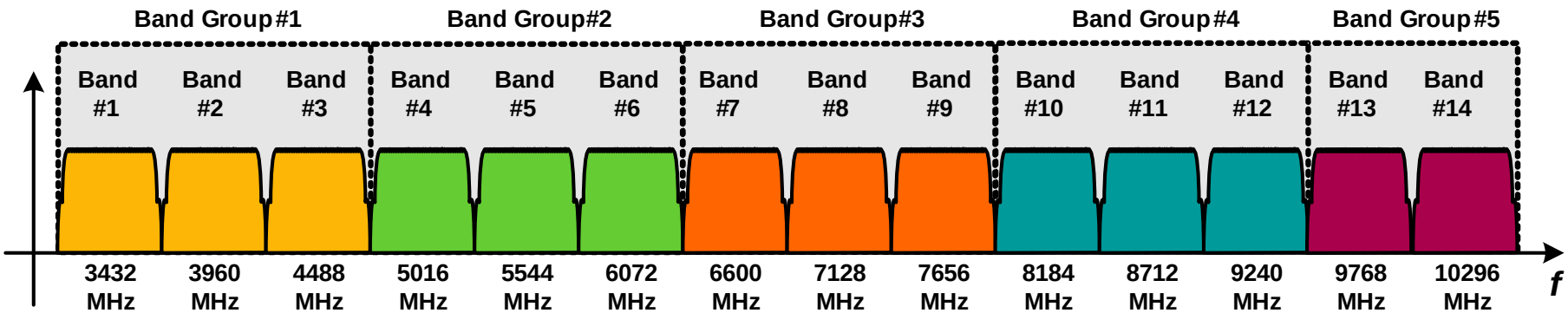
ECMA-368 specifies PHY and MAC layers for:

- **High rate 50-480 Mbps;**
- **Low cost for CE;**
- **Wireless spread spectrum;**
- **Personal Area Network.**

Overview of Multi-band OFDM

Central Idea #1:

- *Divide the spectrum into bands that are 528 MHz wide.*



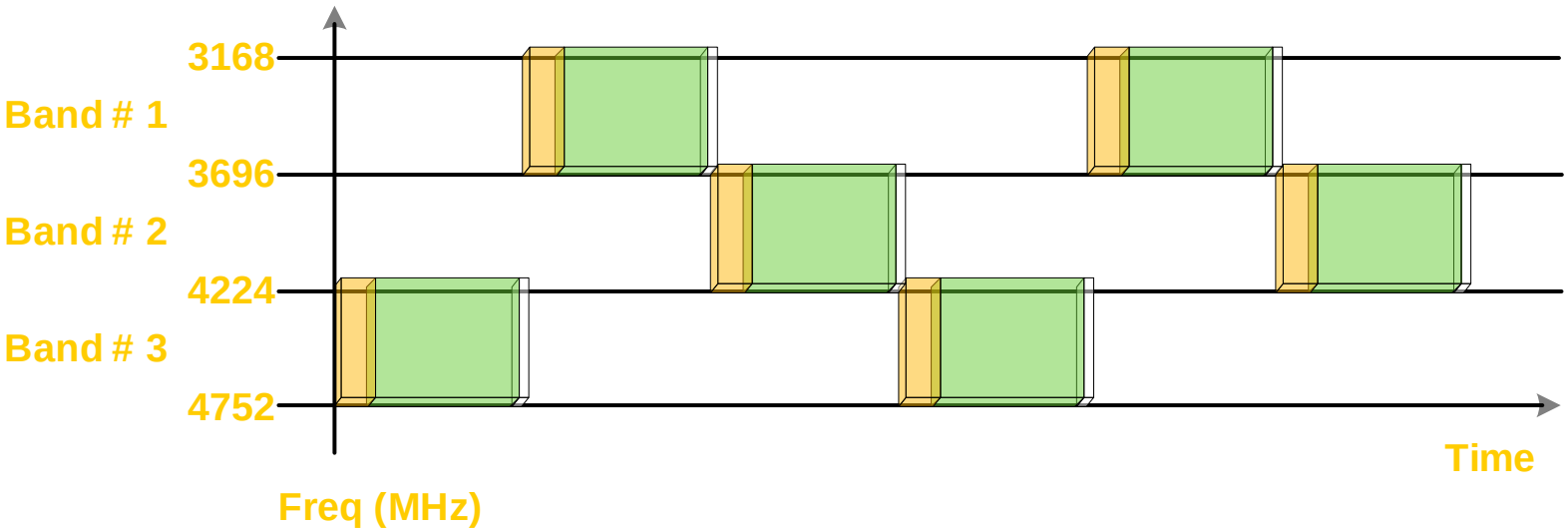
Advantages:

- *Transmitter and receiver process smaller bandwidth signals.*
- *Instantaneous processing BW = 528 MHz.*

Overview of Multi-band OFDM

Central Idea #2:

- *Interleave OFDM symbols across all bands.*



Advantages:

- *Exploits frequency diversity.*
- *Provide robustness against multi-path / interference.*
- *Same transmit power as if the entire band is used.*

Conclusions

Inherent robustness to multi-path in all expected environments.

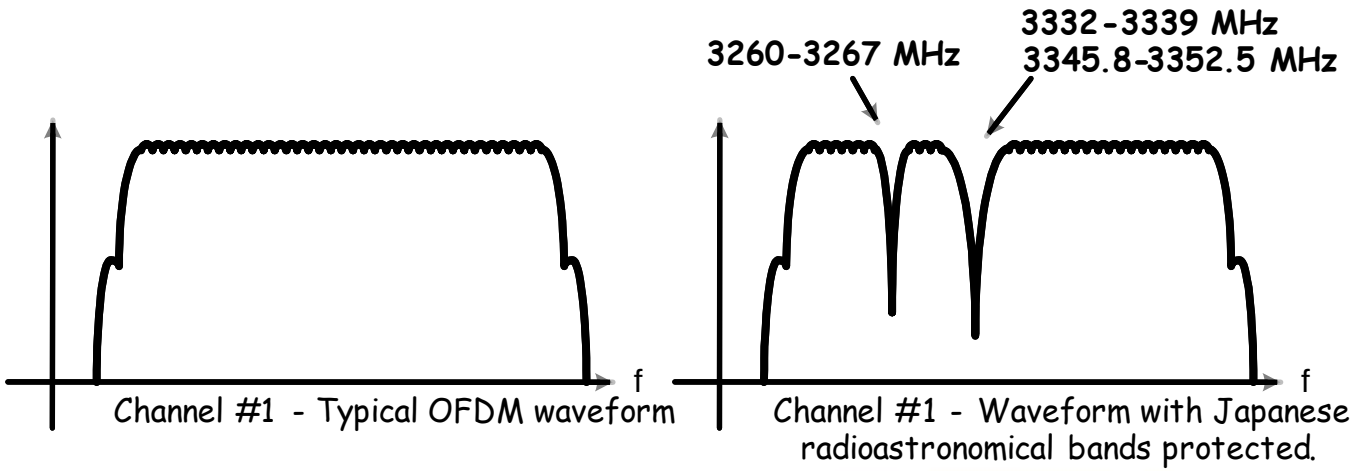
Excellent robustness to U-NII and other generic narrowband interference.

Ability to comply with worldwide regulations:

- *Channels and tones can be turned on/off dynamically to comply with changing regulations.*
- *Can arbitrarily shape spectrum because the tones resolution is ~4 MHz.*

Example: Radio-astronomy bands in Japan.

- *Only need to zero out a few tones in order to protect these services.*



TC32 today
Working methods

TC32, TG17,TG19 and TG20 meet **quarterly**

TG11 and TG20 generally meet **separately** and slightly more frequently mainly in North America

TG14 no longer meets, but conducts any maintenance work by email

TG19 tends to meet separately from TC32 and TG17

Audio conferences used from time to time

Extensive use of **email**

Paperless meetings

Most Standards & Technical Reports fast-tracked to JTC 1

Close relationship with **JTC 1 / SC 6**

SC 6 has early exposure to work of TC32 and opportunity to influence - helps fast-track to run smoothly

TC32 today
Relationship with ETSI

Joint Ecma-ETSI Agreement - covers whole TC32 programme of work

Former EC mandates - resulted in **ENs** (formerly ETSs) for Ecma Standards, aligned with ISO / IEC standards where appropriate

ENs now **endorse** ISO / IEC standards - no significant differences

Use of **other ETSI deliverable types** where ENs not required

Summary

QSIG standards mature, but still being added to

CSTA phase III a stable base and adopted in a number of different environments, including **voice browser** - further **web interoperability** being explored

PISN-IP interoperability work has led to the publication of interworking and tunnelling standards

Investigating positioning within **Next Generation Networks (NGN)**

International recognition for all TC32 work via JTC 1