Internet Telephony and Related Protocols

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Features of Internet Telephony

Beyond just "cheaper phone calls", there are a number of advantages –

- **Adjustable quality:**
  - » *end systems can control the amount of compression based on net-work bandwidth or the content to be transmitted.*
- **Security:**
  - » *it is probably easier to tap a tele-phone demarc box than a router*
  - » *SIP can encrypt and authenticate signaling messages*
  - » *RTP supports encryption of media*
- **User identification:**
  - » *Standard POTS and ISDN telephone service offers no indication of who is talking*
  - » *RTP easily supports talker indication in both multicast and bridged configurations and can convey more detailed information if the caller desires.*

Features of Internet Telephony (cont.)

- **User interface:**
  - » *Most POTS and ISDN telephones have a rather limited user interface, due in part to the limited signaling capabilities of end systems*
  - » *graphical user interface offered by Internet telephony can be more readily customized and offer richer indications of features, process and progress*
- **Computer-telephony integration:**
  - » *CTI is very complex, with specs running to 3,300 pages*
  - » *call handling functionality can be easily accomplished once the data and control path pass through intelligent, network-connected end systems*
- **Feature Ubiquity:**
  - » *current phone system offers very different features depending on whether the par-ties are connected by the same PBX, reside within the same local calling area or are connected by a long-distance carrier*
  - » *Internet protocols are internationally used, and services are defined largely by the end systems.*

Features of Internet Telephony (cont.)

- **Multimedia:**
  - *» adding additional media such as video, shared whiteboards or shared applications is much easier in the Internet environment compared to the POTS and ISDN, as multiplexing is natural for packet networks.*
  - *» This makes signaling protocols simpler as well, as issues such as synchronization are non-existent in the Internet*
- **Silence suppression and compression:**
  - *» PSTN does silence suppression across trans-continental links, IP telephony performs silence suppression at the endpoints*
  - *» reduction in cost: no network support is required to take advantage of end system silence suppression*
  - *» compression can be used at end systems to reduce bandwidth consumption across the entire network*
    - 16 kb/s, which can give both excellent voice quality and reduced bandwidth

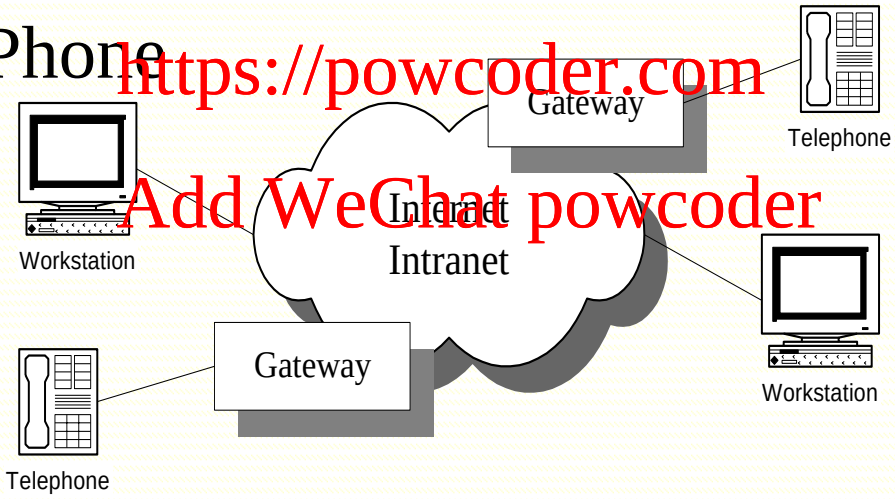
Features of Internet Telephony (cont.)

- **Shared facilities:**
  - » *operational savings from provisioning and managing a single, integrated network, rather than separate voice, data and signaling networks*
- **Advanced services:**
  - » *SIP that support standard CLASS (Custom Local Area Signaling Services) features (such as Call Forward/No Answer) take only a few tens of pages to specify*
  - » *perform the functions of both the user-to-network signaling protocols such as Q.931 as well as the network signaling (ISUP, SS7)*
- **Separation of voice and control flow:**
  - » *Internet call control can concentrate on the call (rather than connection) functionality*
    - – avoid triangle-routing when forwarding or transferring calls;
    - – the transferring party can simply inform the transferred party of the address of the transferred-to party, and the two can contact each other directly.

Voice Over Internet (IP)

Different styles of Voice Over IP calls

- PC to PC
- PC to Phone
- Phone to Phone



A telephony gateway is a network element that provides conversion between the audio signals carried on telephone circuits and data packets carried over the Internet or over other packet networks.

Types of Media Gateways

Trunking gateways:

- interface between the telephone network and a Voice over IP network
- typically manage a large number of digital circuits

Residential gateways:

- provide a traditional analog (RJ11) interface to a Voice over IP network.
- Examples include cable modem/cable set-top boxes, xDSL devices, broad-band wireless devices

Access gateways:

- provide a traditional analog (RJ11) or digital PBX interface to a Voice over IP network
- Examples include small-scale voice over IP gateways

Types of Media Gateways

Business gateways:

- provide a traditional digital PBX interface or an integrated "soft PBX" interface to a Voice over IP network

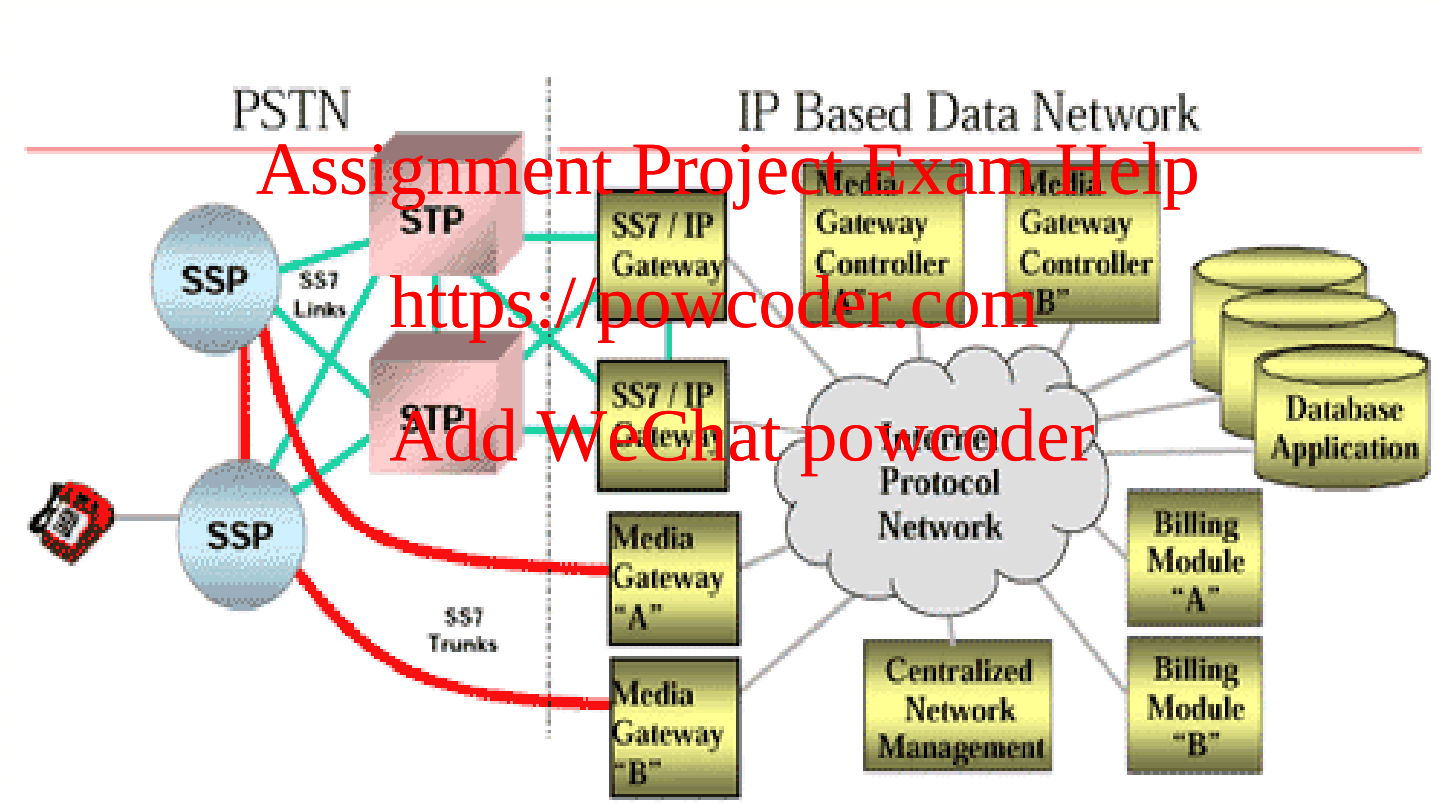
Signaling Gateway:

- handles messages to and from the Signaling System 7 (SS7) network

A typical call flow also involves a Media Gateway Controller, configuration database and an accounting database.

- Media Gateway Controller coordinates address translation, call signal processing, connection establishment, resource management and admissions control in IP network
- Back-end Servers provide directory, accounting and billing services

Distributed IP Telephony Network Architecture



Standards in IP Telephony

International Standards Bodies,

Internet Engineering Task Force, Study Groups and Voice Over IP Protocols,

IETF Working Groups on Audio Video Transport (AVT),

H.323,

Session Initiation Protocol (SIP),

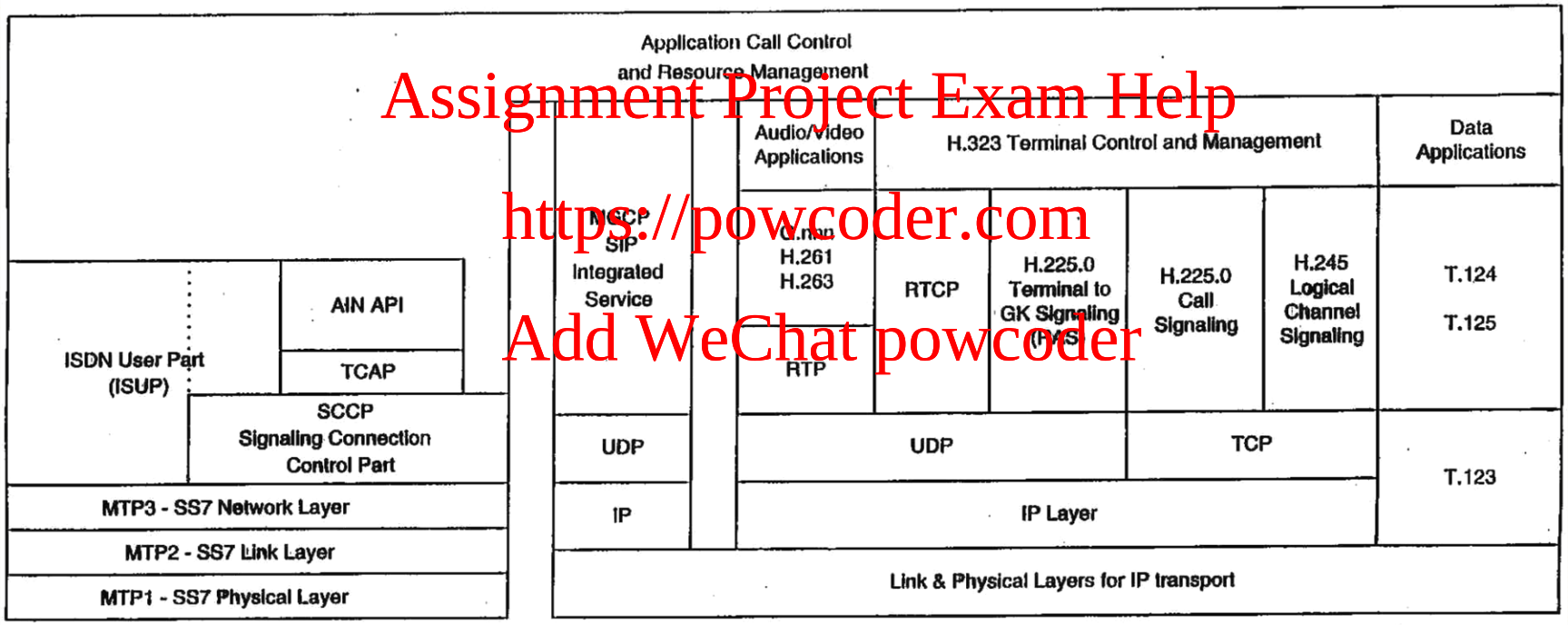
MGCP, MDCP and Media Gateway Control (MEGACO) and Others

ETSI and TIPHON Working Parties and Global Standards,

PSTN-IP Interworking Protocol (PINT),

Multiparty Multimedia Session Control (MMUSIC),

IP Telephony (IPTel)



PSTN/IP Service Integration Architecture With IP Signaling