

Chair for Network Architectures and Services Institute for Informatics TU München – Prof. Carle, Dr. Fuhrmann

Master Kurs Rechnernetze Computer Networks IN2097

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□ ITU-T Recommendation H.323 Version 4

Describes terminals and other entities that provide multimedia communications services over Packet Based Networks (PBN) which may not provide a guaranteed Quality of Service. H.323 entities may provide real-time audio, video and/or data communications.

- □ H.323 framework defines:
 - Call establishment and teardown.
 - Audio visual or multimedia conferencing.







□ H.323 terminals are client endpoints that must support:

- H.225 call control signaling.
- H.245 control channel signaling.
- RTP/RTCP protocols for media packets.
- Audio codecs.

Video codecs support is optional.



- □ A gateway provides translation:
 - For example, a gateway can provide translation between entities in a packet switched network (example, IP network) and circuit switched network (example, PSTN network).
 - Gateways can also provide transmission formats translation, communication procedures translation, H.323 and non-H.323 endpoints translations or codec translation.



- □ Gatekeepers provide these functions:
 - Address translation.
 - Admission control.
 - Bandwidth control.
 - Zone management.
 - Call control signaling (optional).
 - Call authorization (optional).
 - Bandwidth management (optional).
 - Call management (optional).
- Gatekeepers are optional but if present in a H.323 system, all H.323 endpoints must register with the gatekeeper and receive permission before making a call.

H.323 Multipoint Control Unit

- □ MCU provide support for conferences of three or more endpoints.
- □ An MCU consist of:
 - Multipoint Controller (MC) provides control functions.
 - Multipoint Processor (MP) receives and processes audio, video and/or data streams.



H.323 is an "Umbrella" Specification

<u>Media</u>

□ H.261 and H.263 – Video codecs.

□ G.711, G.723, G.729 – Audio codecs.

□ RTP/RTCP – Media.

Data/Fax

□ T.120 – Data conferencing.

□ T.38 – Fax.

Call Control and Signaling

H.245 - Capabilities advertisement, media channel establishment, and conference control.

□ H.225

□ Q.931 - call signaling and call setup.

□ RAS - registration and other admission control with a gatekeeper.





Protocol	Description
H.235	Specifies security and encryption for H.323 and H.245 based
H.450.N	H.450.1 specifies framework for supplementary services. H.450.N recommendation specifies supplementary services such as call transfer, call diversion, call hold, call park, call waiting, message waiting indication, name identification, call completion, call offer, and call intrusion.
H.246	Specifies internetworking of H Series terminals with circuit switched terminals.





□ H.245 – A protocol for capabilities advertisement, media channel establishment and conference control.

□ H.225 - Call Control.

 \Box Q.931 – A protocol for call control and call setup.

□ RAS – Registration, admission and status protocol used for communicating between an H.323 endpoint and a gatekeeper.



- □ Establishing communication using H.323 may occur in five steps:
 - Call setup.
 - Initial communication and capabilities exchange.
 - Audio/video communication establishment.
 - Call services.
 - Call termination.



Simplified H.323 Call Setup

- Both endpoints have previously registered with the gatekeeper.
- Terminal A initiate the call to the gatekeeper. (RAS messages are exchanged).
- The gatekeeper provides information for Terminal A to contact Terminal B.
- Terminal A sends a SETUP message to Terminal B.
- Terminal B responds with a Call Proceeding message and also contacts the gatekeeper for permission.
- Terminal B sends a Alerting and Connect message.
- Terminal B and A exchange H.245 messages to determine master slave, terminal capabilities, and open logical channels.
- The two terminals establish RTP media paths.



Note: This diagram only illustrates a simple point-to-point call setup where call signaling is not routed to the gatekeeper. Refer to the H.323 recommendation for more call setup scenarios.



Version	Date	Reference for key feature summary
H.323 Version 1	May 1996	New release. Refer to the specification. http://www.packetizer.com/iptel/h323/
H.323 Version 2	January 1998	http://www.packetizer.com/iptel/h323/whatsnew v2.html
H.323 Version 3	September 1999	http://www.packetizer.com/iptel/h323/whatsnew v3.html
H.323 Version 4	November 2000	http://www.packetizer.com/iptel/h323/whatsnew _v4.html



□ For more information on H.323 refer to:

□ ITU-T

- http://www.itu.int/itudoc/itu-t/rec/index.html
- Packetizer
 - http://www.packetizer.com/iptel/h323/
- □ Open H.323
 - http://www.openH323.org



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Comparing

SIP and H.323



Comparison with H.323

- H.323 is another signaling protocol for real-time, interactive services
- H.323 is a complete, vertically integrated suite of protocols for multimedia conferencing: signaling, registration, admission control, transport, codecs
- SIP is a single component. Works with RTP, but does not mandate it. Can be combined with other protocols, services

- H.323 comes from the ITU (telephony).
- SIP comes from IETF: Borrows much of its concepts from HTTP
 - SIP has Web flavor, whereas H.323 has telephony flavor.
- SIP was based on the KISS principle: Keep it simple stupid. (Remark: after all SIP extensions, this is not any more the case.)



□ Functionally, SIP and H.323 are similar. Both SIP and H.323 provide:

- Call control, call setup and teardown.
- Basic call features such as call waiting, call hold, call transfer, call forwarding, call return, call identification, or call park.
- Capabilities exchange.



Comparing SIP and H.323 - Strengths

- H.323 Defines sophisticated multimedia conferencing. H.323 multimedia conferencing can support applications such as whiteboarding, data collaboration, or video conferencing.
- SIP Supports flexible and intuitive feature creation with SIP using SIP-CGI (SIP-Common Gateway Interface) and CPL (Call Processing Language).
- SIP Third party call control is currently only available in SIP. Work is in progress to add this functionality to H.323.



	SIP	H.323
Standards Body	IETF.	ITU.
Relationship	Peer-to-Peer.	Peer-to-Peer.
Origins	Internet based and web centric. Borrows syntax and messages from HTTP.	Telephony based. Borrows call signaling protocol from ISDN Q.SIG.
Client	Intelligent user agents.	Intelligent H.323 terminals.
Core servers	SIP proxy, redirect, location, and registration servers.	H.323 Gatekeeper.
Current Deployment	SIP is gaining majority of interest.	Widespread, but considered as "legacy technology".
Interoperability	IMTC sponsors interoperability events among SIP, H.323, and MGCP. For more information, visit: <u>http://www.imtc.org/</u>	
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	SIP	H.323
Capabilities Exchange	SIP uses SDP protocol for capabilities exchange. SIP does not provide as extensive capabilities exchange as H.323.	Supported by H.245 protocol. H.245 provides structure for detailed and precise information on terminal capabilities.
Control Channel Encoding Type	Text based UTF-8 encoding.	Binary ASN.1 PER encoding.
Server Processing	Stateless or stateful.	Version 1 or 2 – Stateful. Version 3 or 4 – Stateless or stateful.
Quality of Service	SIP relies on other protocols such as RSVP, COPS, OSP to implement or enforce quality of service.	Bandwidth management/control and admission control is managed by the H.323 gatekeeper. The H.323 specification recommends using RSVP for resource reservation.



	SIP	H.323
Security	Registration - User agent registers with a proxy server.Authentication - User agent authentication uses HTTP digest or basic authentication.Encryption - The SIP RFC defines three methods of encryption for data privacy.	 Registration - If a gatekeeper is present, endpoints register and request admission with the gatekeeper. Authentication and Encryption - H.235 provides recommendations for authentication and encryption in H.323 systems.
Endpoint Location and Call Routing	Uses SIP URL for addressing. Redirect or location servers provide routing information.	Uses E.164 or H323ID alias and a address mapping mechanism if gatekeepers are present in the H.323 system. Gatekeeper provides routing information.



	SIP	H.323
Features	Basic call features.	Basic call features.
Conferencing	Basic conferencing without conference or floor control.	Comprehensive audiovisual conferencing support. Data conferencing or collaboration defined by T.120 specification.
Service or Feature Creation	Supports flexible and intuitive feature creation with SIP using SIP-CGI and CPL. Some example features include presence, unified messaging, or find me/follow me.	H.450.1 defines a framework for supplementary service creation.

Note: Basic call features include: call hold, call waiting, call transfer, call forwarding, caller identification, and call park.