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**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**H.323**

**Annex D**  
(09/98)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Systems and  
terminal equipment for audiovisual services

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Packet-based multimedia communications systems

**Annex D: Real-time facsimile over H.323  
systems**

ITU-T Recommendation H.323 – Annex D

(Previously CCITT Recommendation)

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**AUDIOVISUAL AND MULTIMEDIA SYSTEMS**

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# **ITU-T RECOMMENDATION H.323**

## **PACKET-BASED MULTIMEDIA COMMUNICATIONS SYSTEMS**

### **ANNEX D**

#### **Real-time facsimile over H.323 systems**

#### **Summary**

This Annex describes a facsimile protocol based on H.323 packet-based multimedia communications systems.

#### **Source**

Annex D to ITU-T Recommendation H.323 was prepared by ITU-T Study Group 16 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 25th of September 1998.

## FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, the ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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## **Recommendation H.323**

### **PACKET-BASED MULTIMEDIA COMMUNICATIONS SYSTEMS**

#### **ANNEX D**

#### **Real-time facsimile over H.323 systems**

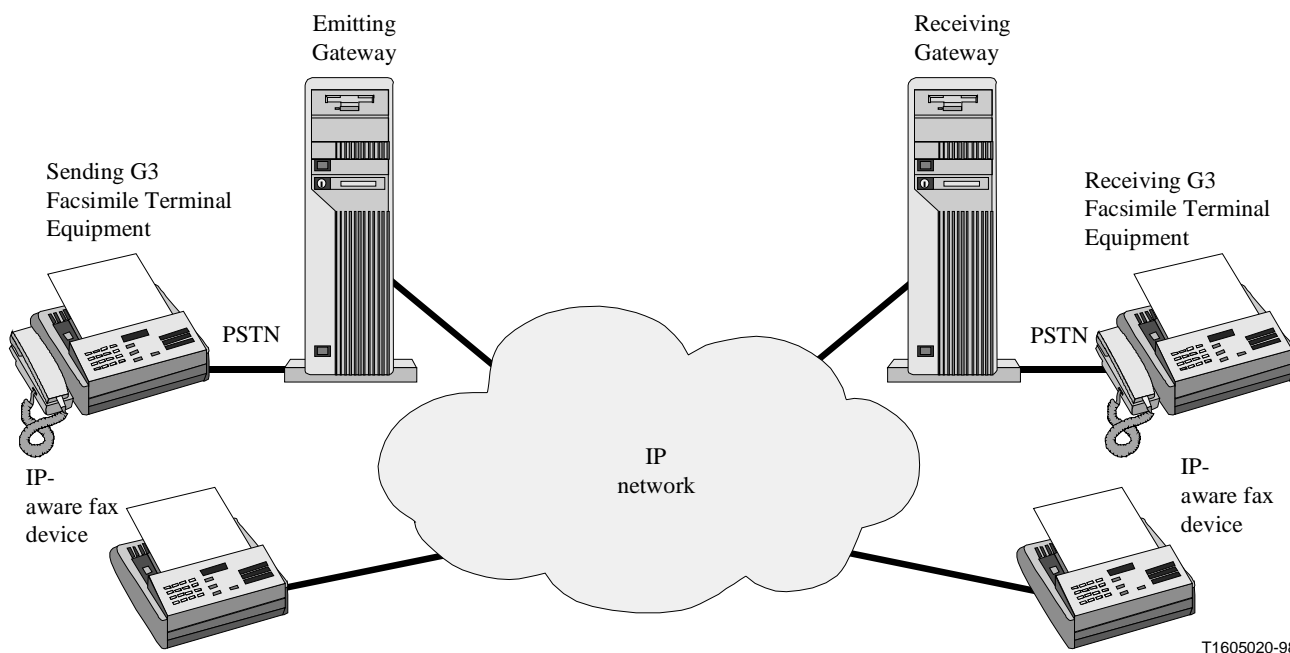
*(Geneva, 1998)*

##### **D.1 Introduction**

Currently, facsimile and speech are typically sent using the PSTN with the same calling and addressing infrastructure. It is highly desirable to continue this approach in the context of Recommendation H.323. From a high level, facsimile can be viewed as another kind of real-time traffic similar to a particular speech coder. This seems appropriate, as facsimile entering the packet world via a gateway from the PSTN should logically be treated in a fashion similar to speech if the customer expects a real-time, assured end-to-end transmission service. The conversion of facsimile to email or other store-and-forward methods represents a new service that is beyond the scope of Recommendation H.323, which is a real-time protocol. It is recognized that manufacturers may wish to provide a gateway that falls back to a store-and-forward service when the real-time facsimile call fails. It is beyond the scope of Recommendation H.323 when and how this decision is made, or by what means a store-and-forward facsimile service is implemented.

Recommendation T.38 [1] defines an Internet facsimile protocol consisting of messages and data exchanged between Facsimile Gateways connected via an IP network. This Annex uses Recommendation T.38. Communication between the Gateways and G3/G4 Facsimile terminals is beyond the scope of Recommendation T.38. The reference model for T.38 is shown in Figure D.1 with three scenarios. In the first scenario, the two traditional Group 3 Facsimile Equipment (G3FE) terminals are virtually connected through the Gateways once the PSTN calls are established. All T.30 session establishment and capabilities negotiation is carried out between the terminals. In the second scenario, the traditional Group 3 Facsimile (IAF) terminal is connected with an Internet Aware Fax terminal (IAF).

The IAF is directly connected to the IP network. In the third scenario, the two IAFs are directly connected to the IP network. In all the scenarios, T.38 packets are used on the IP network to communicate T.4/T.30 facsimile information. The transport of T.38 packets is either on TCP/IP or UDP/IP using the mechanism of Recommendation H.323.



**Figure D.1/H.323 – Model for facsimile transmission over IP networks**

## D.2 Scope

The scope of this Annex is to use H.323 procedures to transfer T.38 packets in real time over the IP network. H.323 entities supporting facsimile capabilities shall use T.38 to support real-time facsimile services as described in this Annex.

H.323 facsimile capable endpoints shall support the usage of TCP and UDP as described in Recommendation T.38. Annex B/T.38 describes a T.38-only capable terminal that supports a subset of H.245 messages using H.245 tunnelling. However, the T.38/Annex B terminal can interwork with an H.323/Annex D terminal using 8.1.7/H.323 "Fast Connect Procedure", and 8.2.1/H.323 "Encapsulation of H.245 Messages within Q.931 Messages" procedures in Recommendation H.323. T.38/Annex B terminals interwork with H.323 terminals without being conformant to Recommendation H.323. An H.323 terminal that supports the procedures of this Annex shall interwork with T.38/Annex B terminals.

## D.3 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text constitute provisions of this Recommendation. At the time of publication the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation T.38 (1998), *Procedures for real-time Group 3 facsimile communication over IP networks*.



## D.4 Procedures for opening channels to send T.38 packets

Fast Connect is used to describe the H.323 procedures for opening channels for the transportation of T.38 packets. The traditional sequence can also be used, though it is not described here.

### D.4.1 Opening the voice channel

Zero, one (sender to receiver channel or receiver to sender channel), or two (sender to receiver channel and receiver to sender channel) logical channels for voice can be opened depending on the capability of the sender and the receiver. The voice channel shall be opened as specified by the procedures in 8.1.7/H.323 "Fast connect". Support of voice by facsimile applications is not mandatory in H.323/Annex D.

### D.4.2 Opening the facsimile channels

Two logical channels (sender to receiver channel and receiver to sender channel) shall be opened for the transfer of T.38 packets. T.38 packets can be transferred using either TCP or UDP. In general, the usage of TCP is more effective when the bandwidth for facsimile communication is limited. On the other hand, the usage of UDP may be more effective when the bandwidth for facsimile communication is sufficient.

The sender terminal specifies a TCP/UDP port in the **OpenLogicalChannel** in the **fastStart** element of *Setup*. The receiver terminal shall provide its TCP (or UDP) port in the **OpenLogicalChannel** of the **fastStart** element as specified by the procedures in 8.1.7/H.323 "Fast connect procedure".

The receiver shall open the TCP/UDP port based on the preference of the sender. If the sender terminal has a preference for UDP or TCP then it shall provide its preference in the **OpenLogicalChannel** with the appropriate port in the **fastStart** sequence. The receiving terminal can select the transport, TCP or UDP, by specifying one of the two in **OpenLogicalChannel** structures in the **fastStart** element of *Connect*.

### D.4.3 DTMF transmission

DTMF tones shall be sent by H.323/Annex D terminals using **UserInputIndication** to interwork with T.38/Annex B terminals. H.323/Annex D terminals may send DTMF tones in-band with the voice when T.38/Annex B terminals are not involved in the call.

## D.5 Non-Fast Start procedures

It is noted that in Non-Fast Start, the normal H.245-based **OpenLogicalChannel** procedures can be used to open and close both UDP and TCP fax channels. Tunnelled H.245 can also be used to open and close channels. It is also noted that non-fast start and non-tunnelled H.245 procedures do not apply to interworking with Recommendation T.38.

## D.6 Usage of the MaxBitRate in messages

When TCP is used for T.38 fax transmission, **maxBitRate** in the ARQ/BRQ does not include the fax data rate, and if a voice link is switched off when the fax session starts, a BRQ shall be used to indicate to the Gatekeeper that the bandwidth has changed. When UDP is used for T.38 fax transmission, **maxBitRate** in the ARQ/BRQ does include the bit rate needed for the fax session. The endpoint (terminal, gateway) shall send BRQs to the gatekeeper as bandwidth needs change during the call. It is noted that the **maxBitRate** in the **OpenLogicalChannel** element in the *Setup* during fast start is different from the **maxBitRate** in ARQ/BRQ, and does refer to the peak bit rate that the fax call will use.

## D.7 Interactions with gateways and T.38/Annex B devices

The following case must be considered:

H.323/Annex D device (with voice) <-> T.38/Annex B device (without voice)

Note that these devices may be terminals or gateways; it does not affect the discussion. A fax call arrives from the "voiceless" side, but the voice side must generate an outgoing voice call that is not connected to anything although tones or announcements might be played. In the opposite direction, the H.323/Annex D device cannot offer a voice call to a "voiceless" device, as it cannot receive voice.

The H.323/Annex D gateway shall send both a voice and fax **OpenLogicalChannel** element in the Setup message. If it encounters a T.38 device, only the fax channel will be opened. If the call mistakenly encounters a non-fax H.323 device, the fax port will not be opened. This is the equivalent of a fax machine calling a telephone.

An H.323/Annex D device becomes aware that it is talking to a T.38/Annex B device due to the following sequence of events:

- 1) The T.38/Annex B device does not supply an H.245 port in the Connect or Setup.
- 2) The H.323/Annex D device uses the Facility message as described in 8.2.3/H.323 and transmits a **FACILITY** message with a **FacilityReason** of **startH245** and provides its H.245 address in the **h245Address** element. The T.38/Annex B endpoint receiving a **FACILITY** message with a **FacilityReason** of **startH245** will respond with a **FACILITY** message having a **FacilityReason** of **noH245**. At this point the H.323/Annex D device should cease all attempts to open the H.245 channel.

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