

RECOMMENDATION ITU-R BT.1549*

Data link protocol for interaction channel

(Question ITU-R 16/6)

(2001)

The ITU Radiocommunication Assembly,

considering

- a) the progress in information processing and communication technologies;
- b) the rapid progress towards enhanced and digital television delivery systems;
- c) the need within such systems for interactivity for a variety of purposes;
- d) the development of communication methods, over various delivery media, suitable for use in receiving, from viewers, return communications related to the programme material (vision, sound and data);
- e) the availability of mass storage media permitting interaction without the requirement of a return channel;
- f) the large number of domestic receivers likely to be impacted by the adoption of interactive services;
- g) the large number of domestic multimedia systems likely to be impacted by the adoption of interactive services;
- h) that return information from viewers can be also provided in a non-automatic way (viewers have to store and then take care of the delivery of the information);
- j) the existence of Recommendation ITU-R BT.1369 – Basic principles for a worldwide common family of systems for the provision of interactive television services;
- k) the need for simpler protocols than Recommendation ITU-R BT.1434, which supports Internet protocol (IP)-based protocols, such that the introduction of interactive services using a return channel might be more easily achieved;

* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in 2002 in accordance with Resolution ITU-R 44.

l) that public switched telephone network (PSTN)/integrated services digital network (ISDN) is one of most generic interaction channels in many countries;

m) the requirement that the simpler protocols should also support a simple level of the security,

recommends

1 that the data link layer protocol for the interaction channel, specified in Annex 1, should be applied when using a low data rate modem and simple data transfer protocols.

ANNEX 1

Data link protocol for interaction channel

1 Scope

This Recommendation specifies the data link layer protocol which can be applied when using a low data rate modem and a simple data transfer protocol for the interaction channel (i.e. non IP-based protocols such as high level data link control (HDLC) (ISO 3309, 4335, 7809), basic mode control procedure for data communication systems (ISO 1745), etc.).

2 Normative references

ITU-T Recommendation X.28 – DTE/DCE interface for a start-stop mode Data Terminal Equipment accessing the Packet Assembly/Disassembly facility (PAD) in a public data network situated in the same country.

3 Reference models

3.1 Assumed connection model for interactive systems

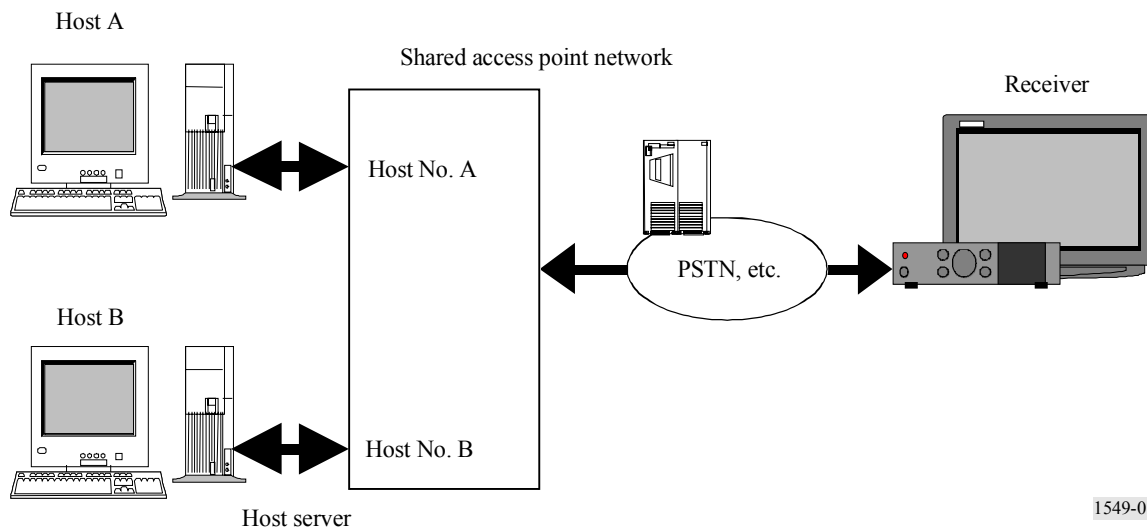
An assumed connection model for interactive systems to which this link layer protocol can be applied is shown below.

NOTE 1 – The model is compliant with the system model of ITU-T Recommendation J.110, and matches the logical model of ITU-T Recommendation J.111 with the exception that the S2 channel for data downloading is not used.

FIGURE 1

Symmetric bidirectional connection model

(Direct connection model: using a shared access point network, receivers can easily select connection to any host server (host) directly)



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3.2 Data transfer phases

Protocols using PSTN for bidirectional interactive services consist of the following five phases:

- *Phase 1:* Line connection phase
- *Phase 2:* Data link establishment phase
- *Phase 3:* Data transmission phase
- *Phase 4:* Data link termination phase
- *Phase 5:* Line disconnection phase.

4 Data link protocol for interaction channel

4.1 Conditions

4.1.1 Telecommunication conditions

Telecommunication conditions for the modem of the receiver are shown in Table 1.

TABLE 1

Telecommunication conditions for the modem of the receiver

	Parameters	Note
Data length (character length)	8 bits	Communication conditions for line connection
Parity	None	
Stop bit	1 bit	
Transmission code system	Specified by each application	
Local echo back	None (remote echo back may be used)	
CR/LF control	From receiver to host: only CR is sent. From host to receiver: CR and LF are sent	
Code for transmission delimiter	CR (0D H)	
Code for new line	LF (0A H)	
Code for input correction	BS (08 H)	
Data transfer sequence	Specified by each application	Communication conditions for modem
Transmission mode	Asynchronous full duplex transmission	
Transmission speed	Above ITU-T Recommendation V.22 <i>bis</i> (2 400 bit/s)	
Flow control	RS/CS	
MNP class	Class 4 or above	

CR: transmission mode

LF: code for new line

MNP: Microcom Networking Protocol

4.1.2 Modem

The modem shall support the specifications, listed above, equal to ITU-T Recommendation V.22 *bis* or higher (e.g. ITU-T Recommendations V.22 *bis*, V.32 and V.32 *bis*) and with the error correction scheme equal to MNP4 or higher (e.g. MNP4, MNP5, ITU-T Recommendations V.42 and V.42 *bis*).

4.1.3 Line connection and disconnection phase

During the line connection and disconnection phase, the receiver connects to and disconnects from the host using PSTN, etc. The line connection and disconnection are controlled by AT (attention) commands for modems, terminal adapter (TA) and data communication adapters (ADP) of mobile phones.

4.2 Protocol for data link establishment and termination phase

In this phase, which starts after the line connection has been effected, a data transmission is established between the receiver and a host. In addition, after data transmission has been completed, the link between the receiver and the host is terminated. These phases can be applied to data transfer protocols, which do not specify a destination address for each data packet. Therefore, this phase is applicable to various types of protocols for interaction channels.