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# Series Q

**Supplement 26**
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SERIES Q: SWITCHING AND SIGNALLING

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# Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS2) and Signalling System No. 7 (B-ISUP) – Support of Services over IP-based networks

ITU-T Q-series Recommendations – Supplement 26

(Formerly CCITT Recommendations)

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**Supplement 26 to ITU-T Q-series Recommendations**

# Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS2) and Signalling System No. 7 (B-ISUP) – Support of Services over IP-based networks


## Summary

This Supplement to the Q-series Recommendations provides guideline information to support session-related ATM Connections over the Broadband Public Network. This Supplement also describes enhancements made to B-ISDN signalling protocols on the UNI and the NNI to support services over IP-based networks.


## Source

Supplement 26 to ITU-T Q-series Recommendations was prepared by ITU-T Study Group 11 (1997-2000) and approved under the WTSC Resolution 5 procedure on 3 December 1999.

## FOREWORD

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

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**Supplement 26 to ITU-T Q-series Recommendations**

# Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS2) and Signalling System No. 7 (B-ISUP) – Support of Services over IP-based networks

## 1 Scope

This Supplement defines DSS2 and B-ISUP capabilities to transport internet related information across the B-ISDN. This allows a private network, based on IP technology (e.g. IP routers), supporting the Internet applications by using signalling protocols defined in the IETF to generate and pass control information transparently through a public network. Figure 1-1 identifies an ATM transport architecture using DSS2 and B-ISUP to transport the such information across the B-ISDN.

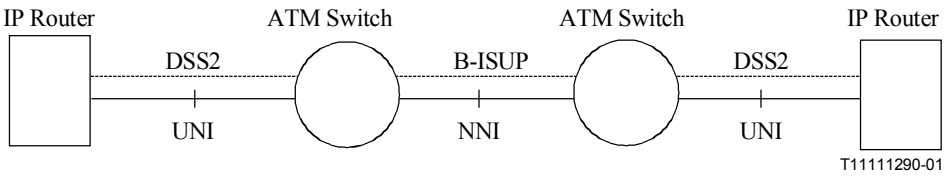



**Figure 1-1 – Reference model**

## 2 References

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

[1] ITU-T Recommendation Q.2763 (1995), *Signalling System No. 7 B-ISDN user part (B-ISUP) – Formats and codes*.

[2] ITU-T Recommendation Q.2730 (1999), *Signalling System No. 7 B-ISDN User Part (B-ISUP) – Supplementary services*.

[3] ITU-T Recommendation Q.2726.4 (2000), *Extensions to the B-ISDN User Part – Application generated identifiers*.

[4] ITU-T Recommendation Q.2941.1 (1997), *Digital subscriber Signalling System No. 2 – Generic identifier transport*.

[5] ITU-T Recommendation Q.2957.1 (1995), *Stage 3 description for additional information transfer supplementary services using B-ISDN digital subscriber signalling System No. 2 (DSS2) – Basic call – User-to-User Signalling (UUS)*.

[6] IETF RFC 2327 (1998) SDP, *Session Description Protocol*.

[7] ITU-T Recommendation Q.2941.2 (1999), *Digital subscriber Signalling System No. 2 (DSS2): Generic identifier transport extensions*.

[8] ITU-T Recommendation Q.2957.1/Amd.1 (1999), *Stage 3 description for additional information transfer supplementary services using B-ISDN Digital Subscriber Signalling System No. 2 (DSS2) – Basic Call.*

## 3 Definitions

This Supplement defines the following term:

**3.1 session**: A multimedia session is a set of multimedia senders and receivers and the data streams flowing from senders to receivers. A multimedia conference is an example of a multimedia session. (RFC 2327 [6]).

## 4 Abbreviations

This Supplement uses the following abbreviations:

| | |
|---|---|
| ATM | Asynchronous Transfer Mode |
| B-HLI | Broadband High Layer Information |
| B-ISDN | Broadband Integrated Services Digital Network |
| B-ISUP | Broadband Integrated Services Digital Network User Part |
| B-LLI | Broadband Low Layer Information |
| DSS2 | Digital Subscriber Signalling System No. 2 |
| GIT | Generic Identifier Transport |
| IE | Information Element |
| IETF | Internet Engineering Task Force |
| IP | Internet Protocol |
| NNI | Network Node Interface |
| QoS | Quality of Service |
| RSVP | Resource Reservation Protocol |
| ST2+ | Internet Stream Protocol Version 2+ |
| UNI | User Network Interface |
| UUI | User-User Information |
| VC | Virtual Channel |
| VP | Virtual Path |

## 5 Session-related ATM Connection

With the development of new multimedia applications on the current Internet, the demands for multimedia support are increasing in IP-based networks, which currently support only best effort communications. In particular, demands to support QoS guaranteed communications are increasing with the development of voice, audio, and video communications applications.

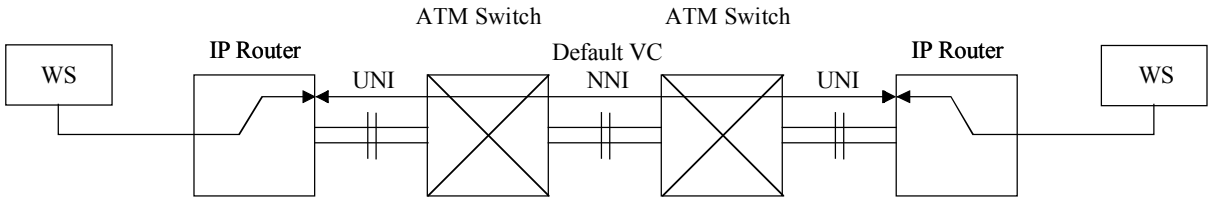
The major features of B-ISDN are high speed, logical multiplexing with the VP/VC, and flexible QoS management per VC, so it is quite natural to use these distinctive functions of B-ISDN to implement a multimedia support mechanism for the benefit of IP-based networks. The flexible QoS management and logical multiplexing functions in B-ISDN provide the QoS guaranteed

communications for the Internet. Furthermore, when a long-lived session is supported by a particular VC, efficient packet forwarding may be possible using the high speed and logical multiplexing of B-ISDN.

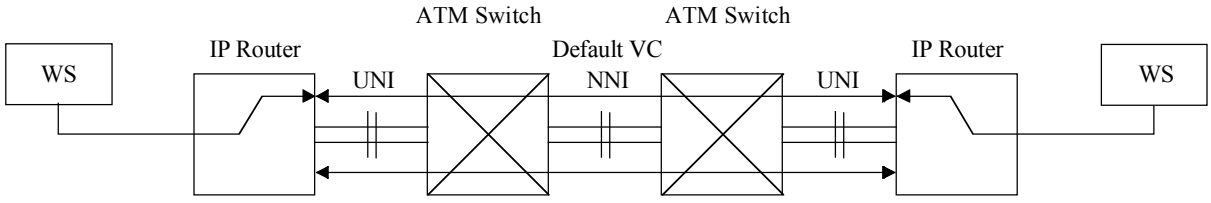
This clause clarifies B-ISDN signalling functions that are required when a session is supported by the VC, using advanced B-ISDN signalling support of the Internet Protocol.

## 5.1 Long-lived Session Signalling

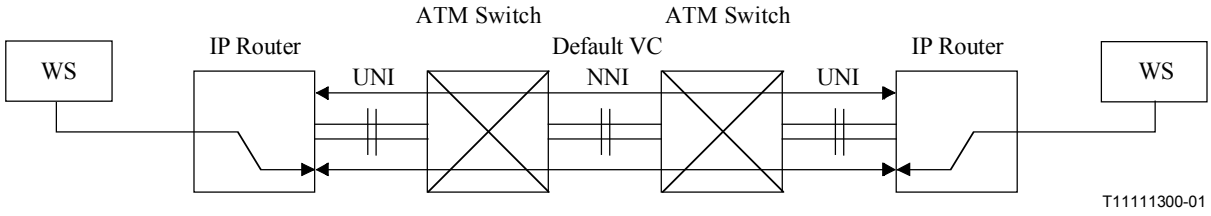
An example of a scenario for establishing a VC for a long-lived session is shown in Figure 5-1.




**a) New session initially forwarded over a default VC**




**b) New VC is set up for the long-lived session**




**c) Transfer of a the long-lived session to a new VC**

**Figure 5-1 – Example of a scenario for establishing a VC for a long-lived session**

Initially, the session may be multiplexed into a default VC connecting the routers. If the router detects that it is a long-lived session, it may set up a new VC for this specific session. Once the new VC is established successfully, the long-lived session may be transferred to the new VC.

The mechanisms by which the router detects a long-lived session and moves it to the new VC are implementation specific and may depend on the network configuration.

In this procedure involving an ATM VC set-up, the B-ISDN signalling entity in the called side router must detect that the incoming call corresponds to a session of the Internet Protocol and notify that fact to the IP layer entity. Based on this information, the IP layer entity moves the session to the new VC.

Therefore, to implement this signalling procedure, the B-ISDN signalling must include a session identifier as an information element. The Broadband Low Layer Information (B-LLI), Broadband High Layer Information (B-HLI), User-User Information (UUI), and Generic Identifier Transport (GIT) Information elements are all capable of transferring this information. Considering the original purposes of these information elements, the most appropriate one to use is the Generic Identifier Transport information element. Recommendations Q.2941.1 [4] and Q.2941.2 [7] document this specific use of GIT. The Application generated Identifier parameter, defined in Recommendation Q.2726.4 [3], would be used at the NNI to identify the session.

## 5.2 QoS-sensitive Session Signalling

An alternative class of session is known as a "QoS-sensitive Session". The major difference between QoS-sensitive session signalling and long-lived session signalling is that call set-up is not initiated by the detection of a long-lived session, but is explicitly initiated by the set-up protocol, such as ST2+ or RSVP. To implement QoS-sensitive session signalling using ATM, the ATM network between the routers must forward not only the session identifier but also the set-up protocol.

There are two schemes for forwarding the set-up protocol. One is to multiplex the protocol into a default VC connecting the routers, or to forward the protocol through a particular VC. In this case, the QoS-sensitive session and the ATM VC are established sequentially. The second scheme is to forward the setup protocol as an information element in the B-ISDN signalling. In this case, the QoS-sensitive session and the ATM VC are established simultaneously. The latter scheme has the following advantages compared with the former one:

a) *Ease of implementation*

   Admission control is simplified, because admission control for the IP and ATM layers can be done simultaneously. Watchdog timer processing is simplified, because there is no need to watch the IP layer establishment and ATM layer establishment sequentially.

b) *Potential use of negotiation in VC establishment*

   However, the latter scheme, at least, cannot support a case where a PVC is used to support a QoS-sensitive session. Therefore, both procedures should be taken into account. An example of a message sequence that simultaneously establishes a QoS-sensitive session and an ATM VC is shown in Figure 5-2.

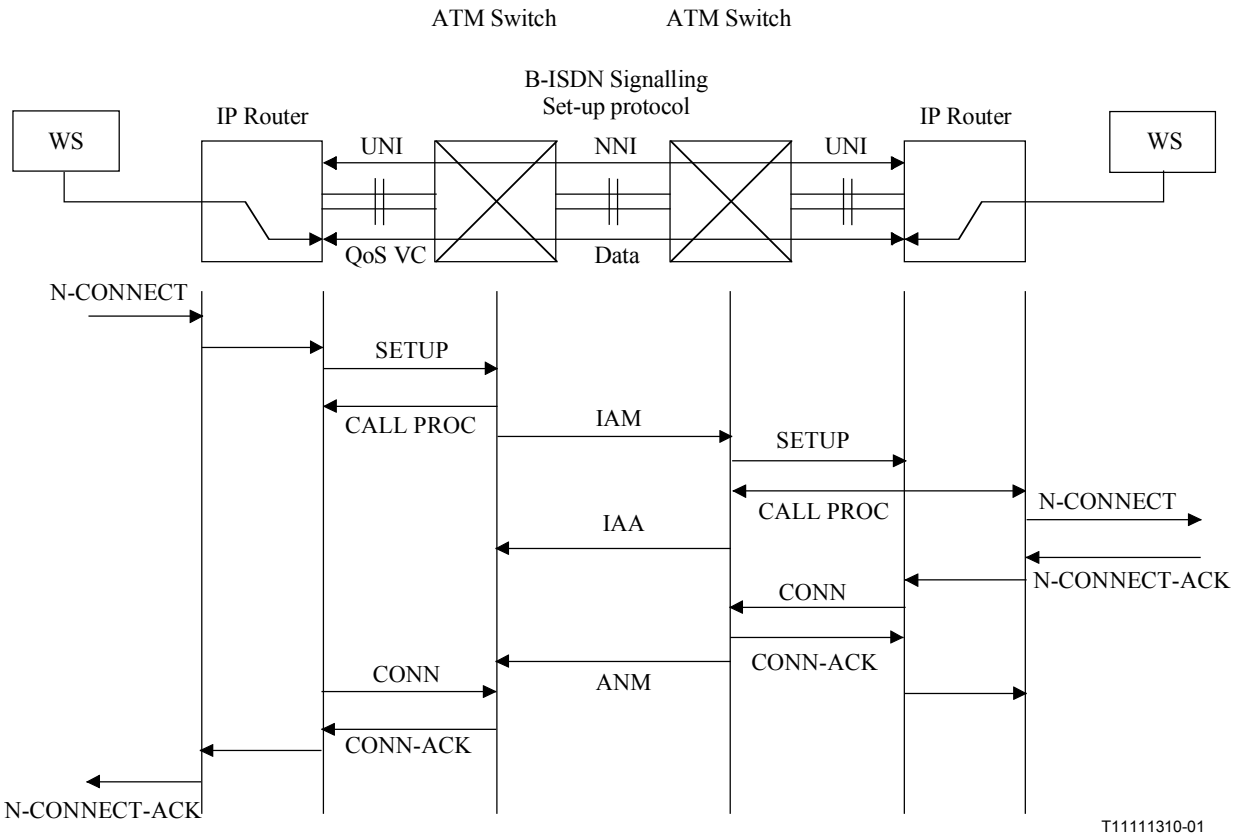



**Figure 5-2 – Example procedure for simultaneous QoS-sensitive session and ATM VC establishment**

Alternative session control protocols are currently being proposed in the IETF for the set-up protocol and new set-up protocols are likely to be developed in the near future. Therefore, to generalize the discussion, the procedure for the set-up protocol in this example is a general connection set-up procedure using confirmed service.

In supporting a receiver initiated case, procedures other than the sequential set-up may be used, and further collaboration with IETF is needed.

To implement this signalling procedure, B-ISDN signalling must include in the User-user information information element an indication that the capacity is sufficient to forward the set-up protocol. This is documented in Recommendations Q.2957.1 [5] and Q.2957.1/Amd.1 [8]. The User-user information parameter of B-ISUP, defined in Recommendation Q.2763 [1], would be used at the NNI. Procedures for handling of this parameter are given in Recommendation Q.2730 [2].

NOTE – APM could be potentially used as an alternative, and is for further study.

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