   **The Assignment of the Information Field and Protocol Identifier
    in the Q.2941 Generic Identifier and Q.2957 User-to-user Signaling
                     for the Internet Protocol**
                 <draft-ietf-mpls-git-uus-01.txt>

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Abstract

   The purpose of this document is to specify the assignment of the
   information field and protocol identifier in the Q.2941 Generic
   Identifier and Q.2957 User-to-user Signaling for the Internet
   protocol.

   The assignment, that is specified in section 4 of this document, is
   designed for advanced B-ISDN signaling support of the Internet
   protocol, especially the B-ISDN signaling support for the connection
   that corresponds to the session in the Internet protocol which is
   clarified in section 2. This specification provides an indispensable
   framework for the implementation of long-lived session and QoS-
   sensitive session transfers over ATM.

0. **Background**

In the ITU-T SG11 Geneva meeting held in May 1998, SG11 WP1, which
has responsibility for the B-ISDN signaling protocol recommendation,
decided to enhance the Q.2941 Generic Identifier Transport based on
this document and developed the Awaiting-review text. WP1 also
decided to continue discussion on the User-to-user Signaling support
for the Internet protocol.

In the ITU-T SG11 WP1 Oostend meeting held in November 1998, WP1
developed the Cooling text (Draft Recommendations to be frozen in the
next meeting, if no significant technical changes are proposed in
that meeting) of Q.2941.2 GIT [4]. WP1 also decided to enhance the
Q.2957 User-to-user Signaling based on this document and developed
the Awaiting-review text [5].

Expected standard development process (fastest case) for the
enhancement of the Generic Identifier and User-to-user Signaling is:

March 1999: Freeze the Draft Recommendations and letter ballot is
  requested.

February 2000: The Draft Recommendations are decided (final
  approval).

The purpose of this document is to specify the assignment of the
information field and protocol identifier in the Q.2941 Generic
Identifier and Q.2957 User-to-user Signaling for the Internet
protocol. Note that the assignment rule for Generic Identifier and
User-to-user Signaling described in this document may be subject to
change.

1. **Purpose of Document**

The purpose of this document is to specify the assignment of the
information field and protocol identifier in the Q.2941 Generic
Identifier and Q.2957 User-to-user Signaling for the Internet
protocol.

The assignment, that is specified in section 4 of this document, is
designed for advanced B-ISDN signaling support of the Internet
protocol, especially the B-ISDN signaling support for the connection
that corresponds to the session in the Internet protocol which is
clarified in section 2. Needless to say, the purpose of this
specification is not limited to this support, and it should also be
applicable to other purposes.

   This specification provides an indispensable framework for the
   implementation of long-lived session and QoS-sensitive session
   transfers over ATM. Note that this document only specifies the
   assignment of the information field and protocol identifier, and that
   it may not specify complete protocol that enables interoperable
   implementation. This is because it is beyond the scope of this
   document and will be specified in a separate document.

2. Session-related ATM Connection

   With the development of new multimedia applications on the current
   Internet, the demands for multimedia support are increasing in the IP
   network, which currently supports best effort communications. In
   particular, demands to support QoS guaranteed communications are
   increasing with the development of voice, audio, and video
   communications applications. And it may also be necessary to
   introduce the mechanism that can efficiently transfer the huge volume
   of traffic expected with these 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 in the IP network. The flexible QoS
   management and logical multiplexing functions in B-ISDN are the
   expected method of implementing the QoS guaranteed communications in
   the Internet. And 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 section clarifies B-ISDN signaling functions that are required
   when the session is supported by the VC, for advanced B-ISDN
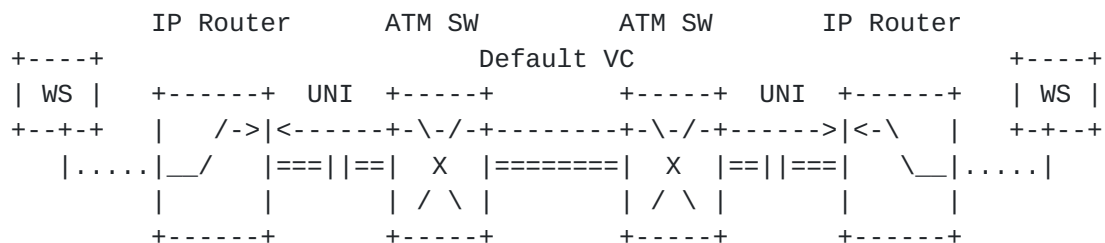   signaling support of the Internet protocol.

2.1 Long-lived Session Signaling

   An example scenario for establishing a VC for a long-lived session is
   shown in Fig. 2.1.

```
            IP Router      ATM SW        ATM SW       IP Router
  +----+                      Default VC                         +----+
  | WS |    +------+ UNI  +-----+         +-----+ UNI  +------+   | WS |
  +--+-+    |   /->|<------+-\-/-+--------+-\-/-+------>|<-\   |   +-+-+
    |.....|__/   |===||==|  X  |=======|  X  |==||===|   \__|.....|
    |       |      | / \ |       | / \ |       |      |
    +------+      +-----+         +-----+      +------+

            A. New session initially forwarded over a default VC.


            IP Router      ATM SW        ATM SW       IP Router
  +----+                      Default VC                         +----+
  | WS |    +------+ UNI  +-----+         +-----+ UNI  +------+   | WS |
  +--+-+    |   /->|<------+-\-/-+--------+-\-/-+------>|<-\   |   +-+--+
    |.....|__/   |===||==|  X  |=======|  X  |==||===|   \__|.....|
    |       |<------+-/-\-+--------+-/-\-+------>|      |
    +------+      +-----+         +-----+      +------+
                      New VC is set up

            B. New VC is set up for the long-lived session.


            IP Router      ATM SW        ATM SW       IP Router
  +----+                      Default VC                         +----+
  | WS |    +------+ UNI  +-----+         +-----+ UNI  +------+   | WS |
  +--+-+    |      |<------+-\-/-+--------+-\-/-+------>|      |   +-+--+
    |.....|__     |===||==|  X  |=======|  X  |==||===|     __|.....|
    |  \-->|<------+-/-\-+--------+-/-\-+------>|<--/   |
    +------+      +-----+         +-----+      +------+
                      New VC
```
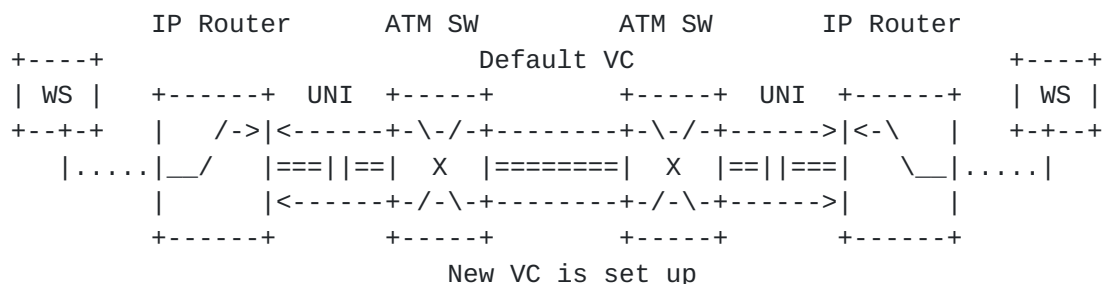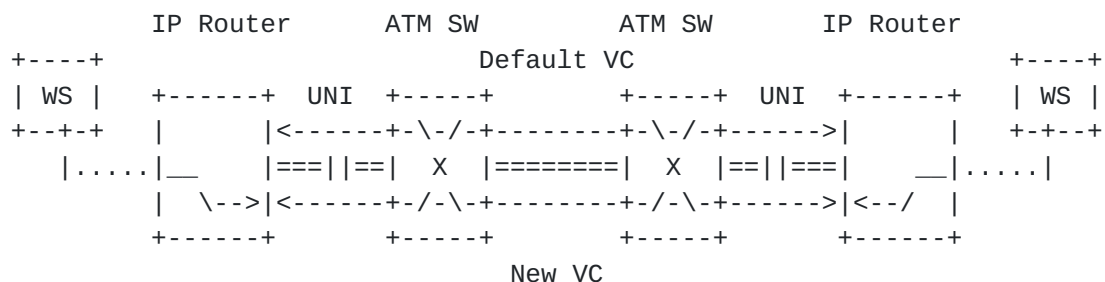
        C. Transfer of the long-lived session to a new VC.

Fig. 2.1: Example scenario for establishing a VC for a long-lived session.

First, a session is multiplexed into the default VC connecting the
routers. Then, if a router detects that it is a long-lived session,
it sets up a new VC for the session. If the new VC is established
successfully, the long-lived session is moved to the new VC.

In this procedure involving an ATM VC setup, the B-ISDN signaling
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 signaling procedure, the B-ISDN
   signaling must include an session identifier as an information
   element. The B-LLI, B-HLI, User-user, and Generic Identifier
   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
   information element.

2.2 QoS-sensitive Session Signaling

   The major difference between QoS-sensitive session signaling and
   long-lived session signaling is that call setup is not initiated by
   the detection of a long-lived session, but is explicitly initiated by
   the setup protocol such as ST2+ and RSVP. To implement QoS-sensitive
   session signaling using ATM, the ATM network between the routers must
   forward not only the session identifier but also the setup protocol.

   There are two schemes for forwarding the setup 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 signaling. 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.

   o Easier to implement.

     - 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.

   o If the setup protocol supports negotiation, then an ATM VC whose
     QoS is based on the result of negotiation can be established.

   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 Fig. 2.2.

```
          IP Router       ATM SW        ATM SW       IP Router
   +----+                    B-ISDN Signaling                  +----+
   | WS |    +------+  UNI  +-----+ Setup  +-----+  UNI  +------+   | WS |
   +--+-+    |   /->|<------+-\-/--Protocol--\-/-+------>|<-\   |   +-+--+
     |.....|__/   |===||==|  X  |=======|  X  |==||===|   \__|.....|
     |  \-->|<------+-/-\-+--------+-/-\-+------>|<--/   |
        +------+        +-----+  Data  +-----+        +------+
                                   QoS VC
    N-CONNECT |                                               |
   ---------->|   |                 |              |          |   |
             |->|    SETUP    |                 |              |   |
             |   |------------>|                 |              |   |
             |   |<------------|                 |              |   |
             |   |  CALL PROC  |----------->|    SETUP     |   |
             |   |             |                 |------------>|   |
             |   |             |                 |            |->|  N-CONNECT
             |   |             |                 |            |   |---------->
             |   |             |                 |            |   |<----------
             |   |             |                 |    CONN    |<-|  N-CONNECT-ACK
             |   |             |                 |<------------|   |
             |   |             |                 |------------>|   |
             |   |    CONN     |<-----------|   CONN ACK   |->|
             |   |<------------|                 |              |   |
             |   |------------>|                 |              |   |
             |<-|   CONN ACK   |                 |              |   |
   <----------|   |                 |              |              |   |
    N-CONNECT |                                               |
         -ACK
```
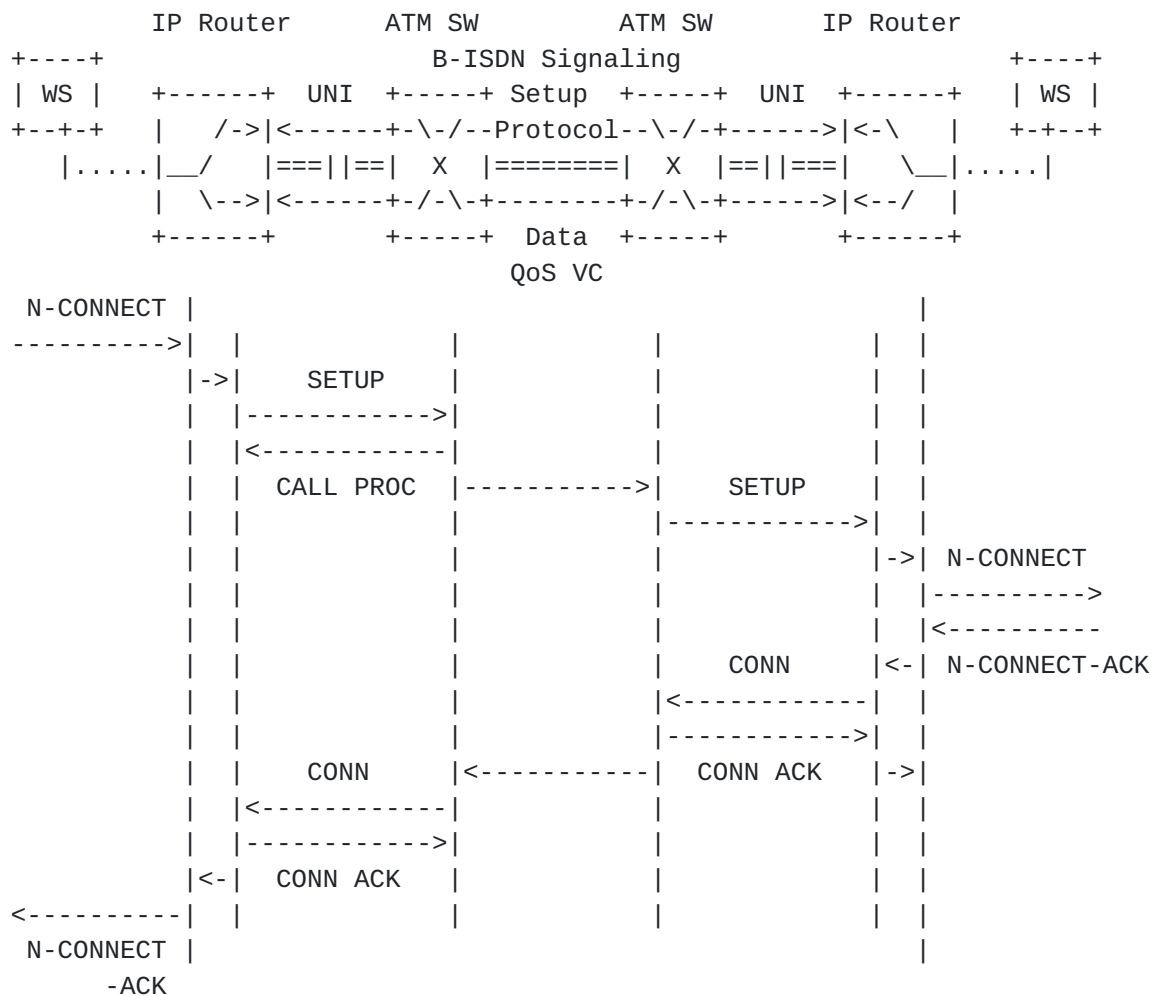
Fig. 2.2: Example procedure for simultaneous QoS-sensitive session and
          ATM VC establishment.

Both ST2+ and RSVP are currently proposed for the setup protocol and
new setup protocols are likely to be developed in the near future.
Therefore, to generalize the discussion, the procedure for the setup
protocol in this example is the general connection setup procedure
using confirmed service.

To implement this signaling procedure, the B-ISDN signaling must
include the User-user information element that the capacity is
sufficient to forward the setup protocol.

3. Overview of the Generic Identifier and User-to-user Signaling

3.1 Overview of the Generic Identifier

   The Generic Identifier enables the transfer of identifiers between
   end-to-end users in the ATM network, and it is defined in the Q.2941
   Part 1 (Q.2941.1) and Part 2 (Q.2941.2) as an optional information
   element for the Q.2931 and Q.2971 UNI signaling protocol. The SETUP,
   ALERTING, CONNECT, RELEASE, RELEASE COMPLETE, ADD PARTY, PARTY
   ALERTING, ADD PARTY ACK, ADD PARTY REJECT, DROP PARTY, and DROP PARTY
   ACK messages that are transferred between end-to-end users in the ATM
   network may contain up to three Generic Identifier information
   elements. The ATM network transfers the Generic Identifier
   information element transparently if it contains no coding rule
   errors.

   The format of the Generic Identifier information element specified in
   the Q.2941 is shown in Fig. 3.1.

```
                         Bits
              8    7    6    5    4    3    2    1   Octets
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |          Information element identifier       |
           |     = Generic identifier transport IE (0x7F)  |  1
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |  1  |   Coding   |    IE instruction field    |
           | Ext |  standard  |Flag |Res. |   IE action ind. |  2
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |   Length of contents of information element   |  3-4
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |    Identifier related standard/application    |  5
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |                Identifier type                |  6
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |               Identifier length               |  7
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |                Identifier value               |  8-
           =                                               =
           +-----+-----+-----+-----+-----+-----+-----+-----+
           =                                               =
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |                Identifier type                |
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |               Identifier length               |
           +-----+-----+-----+-----+-----+-----+-----+-----+
           |                Identifier value               |
           =                                               =
           +-----+-----+-----+-----+-----+-----+-----+-----+
```
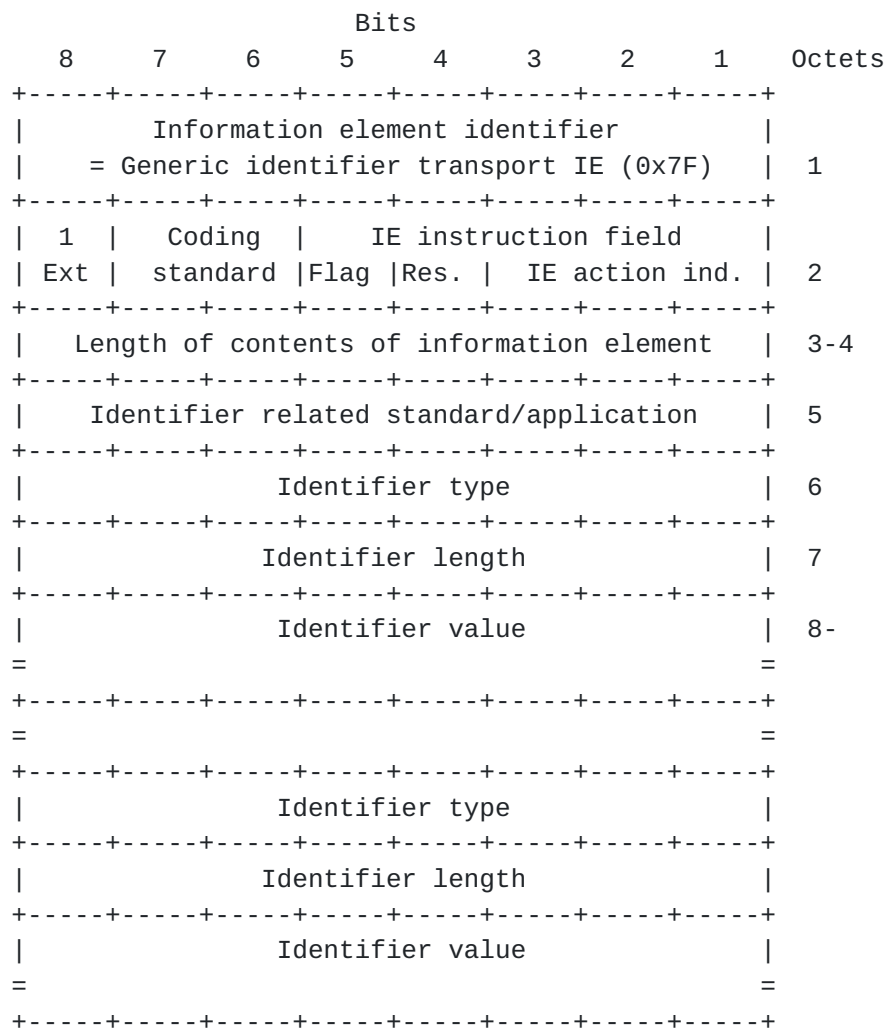
     Fig. 3.1: Format of the Generic Identifier information element.

   The usage of the first 4 octets of fields is specified in section 4
   of the Q.2931.

   The Identifier related standard/application field identifies the
   standard or application that uses the identifier. Assignment of the
   Identifier related standard/application field for the Intenet
   protocol is as follows. A leading 0x means hexadecimal.

      0x03: IPv4.

      0x04: ST2+.

      0x05: IPv6.

      0x06: MPLS.

   Note: DSM-CC, H.310/H.321, Trunking, and MPOA are also supported.

   A transferred identifier is given by the combination of the
   Identifier type, length and value fields, and a Generic Identifier
   information element may contain multiple identifiers.

   Assignment of the Identifier type field for the Intenet protocol is
   as follows. A leading 0x means hexadecimal.

     0x01: Session.

     0x02: Resource.

     0x03-0xFD: Reserved for IANA assignment.

     0xFE: Experiment/Organization specific.

   The maximum length of the Generic Identifier information element is
   63 octets.

   See the Q.2941.1 and Draft Q.2941.2 for detailed protocol
   specifications of the Generic Identifier.

3.2 Overview of the User-to-user Signaling

   The User-to-user Signaling enables the transfer of information
   between end-to-end users in the ATM network, and it is defined in
   Q.2957 and in Q.2971 annex D as an optional information element for
   the Q.2931 and Q.2971 UNI signaling protocol. The SETUP, ALERTING,
   CONNECT, RELEASE, RELEASE COMPLETE, PROGRESS, ADD PARTY, PARTY
   ALERTING, ADD PARTY ACK, ADD PARTY REJECT, DROP PARTY, and DROP PARTY
   ACK messages that are transferred between end-to-end users in the ATM
   network may contain a User-user information element. The ATM network
   transfers the User-user information element transparently if it
   contains no coding rule errors.

   From the viewpoint of B-ISDN signaling applications, it seems the
   Generic Identifier and User-to-user Signaling are similar functions.
   But their rules for processing exceptions are not completely the
   same, because their purposes are different. The Generic Identifier is
   designed for the transfer of identifiers between the c-planes, while
   the User-to-user Signaling is designed for the transfer of user data
   via the c-planes. Another difference is that the latter supports
   interworking with the user-user information element in the Q.931 N-
   ISDN signaling, but the Generic Identifier does not. Note that the
   ATM network may check the contents of the Generic Identifier
   information element, but does not check the contents of the User-to-

user information element.

The format of the User-user information element is shown in Fig. 3.2.

```
                    Bits
        8     7     6     5     4     3     2     1    Octets
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |          Information element identifier       |
      |      = User-user information element (0x7E)   |   1
      +-----+-----+-----+-----+-----+-----+-----+-----+
      | 1   |   Coding  |     IE instruction field    |
      | Ext |  standard |Flag |Res. |   IE action ind. |   2
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |   Length of contents of information element   |  3-4
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |             Protocol discriminator            |   5
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |               User information                |  6-
      =                                               =
      |                                               |
      +-----+-----+-----+-----+-----+-----+-----+-----+
```
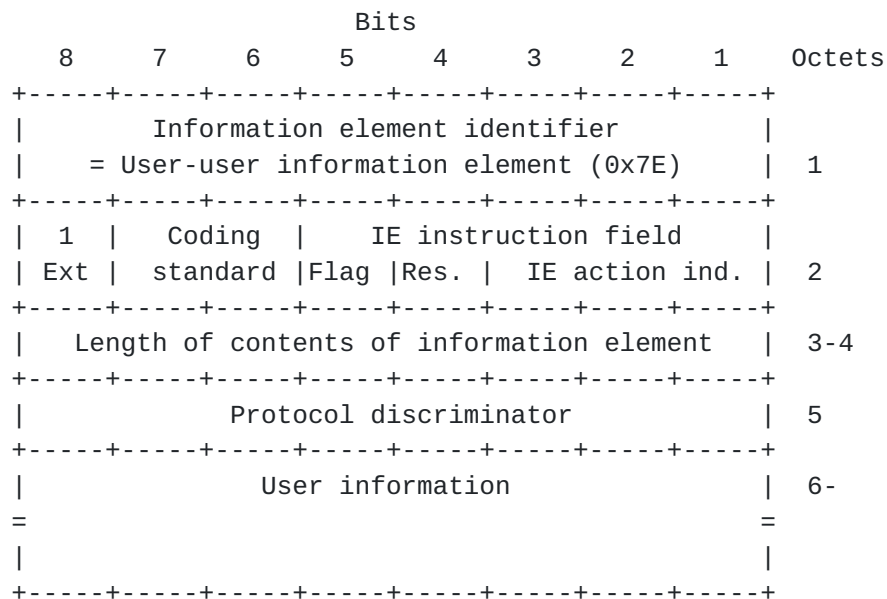
Fig. 3.2: Format of the User-user information element.

The usage of the first 4 octets of fields is specified in section 4 of the Q.2931.

The Protocol discriminator field identifies the upper layer protocol that uses the user-user information.

The User information field contains the user-user information to be transferred.

The maximum length of the User-user information element is 133 octets.

See Draft Q.2957 and Q.2971 annex D for detailed protocol specifications of the User-to-user Signaling.

4. Information Field and Protocol Identifier Assignment

4.1 Assignment in the Generic Identifier Information Element

4.1.1 Use of Generic Identifier

   The information field and protocol identifier assignment principle
   for the Internet protocol in the Generic Identifier information
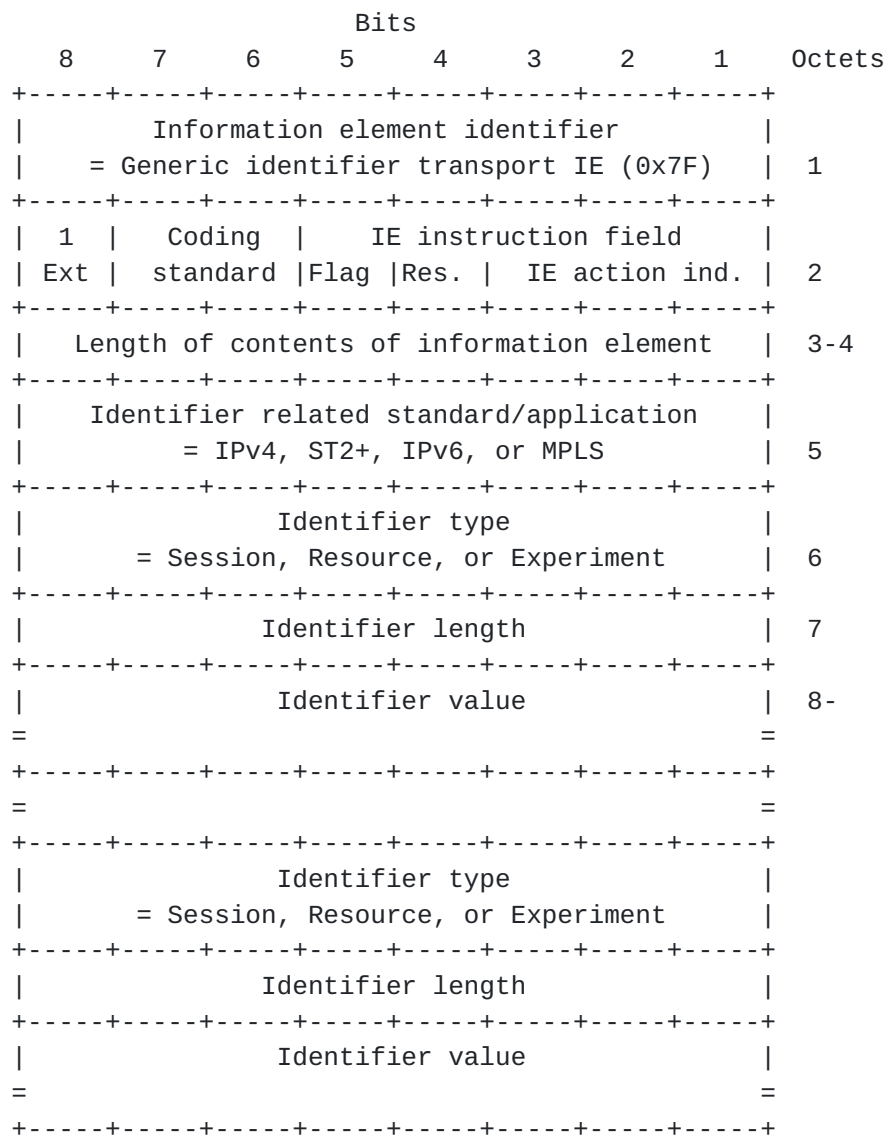   element is shown in Fig. 4.1.

```
                          Bits
            8     7     6     5     4     3     2     1    Octets
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |          Information element identifier       |
          |     = Generic identifier transport IE (0x7F)  |  1
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |  1  |   Coding   |    IE instruction field    |
          | Ext |  standard  |Flag |Res. |   IE action ind. |  2
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |   Length of contents of information element   |  3-4
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |     Identifier related standard/application   |
          |          = IPv4, ST2+, IPv6, or MPLS          |  5
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier type                |
          |       = Session, Resource, or Experiment      |  6
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier length              |  7
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier value               |  8-
          =                                               =
          +-----+-----+-----+-----+-----+-----+-----+-----+
          =                                               =
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier type                |
          |       = Session, Resource, or Experiment      |
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier length              |
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier value               |
          =                                               =
          +-----+-----+-----+-----+-----+-----+-----+-----+
```

        Fig. 4.1: Principle of assignment in the Generic Identifier
                  information element.

The Identifier related standard/application field is the IPv4, ST2+, IPv6, or MPLS.

The Identifier type field is the Session, Resource, or Experiment/Organization specific.

The Identifier value field is assigned to Internet protocol related information which is identified by the Identifier related standard/application field and Identifier type field. The following identifiers are specified.

	Std./app.	Id type
IPv4 session identifier	IPv4	Session
ST2+ session identifier	ST2+	Session
IPv6 session identifier	IPv6	Session
MPLS VCID	MPLS	Resource
Exp./Org. specific	IPv4/ST2+/IPv6/MPLS	Experiment

As described in section 3.1, the B-ISDN signaling message transferred between end-to-end users may contain up to three Generic Identifier information elements. These elements may contain multiple identifiers. This document does not specify the order of identifiers when multiple identifiers appear in a signaling message.

This document also does not specify the semantics when multiple identifiers having the same Identifier type appear in a signaling message, or when a signaling message contains a Generic Identifier information element that does not contain identifiers.

When a B-ISDN signaling message containing a Generic Identifier information element enters an ATM network that does not support the Generic Identifier, the network clears the call, discards the information element, or discards the signaling message. (See sections 4.5.1 and 5.6.8.1 of Q.2931 and section 9.3 of Q.2941.1 for details.)

To enable reliable Generic Identifier information element transfer, when the calling party sends a SETUP or ADD PARTY message with up to three Generic Identifier information elements, the CONNECT or ADD PARTY ACK message returned by the called party must contain at least one Generic Identifier information element. The called party may not respond with the same identifiers received from the calling party.

The calling party should confirm that the response message contains
at least one Generic Identifier information element.

4.1.2 IPv4 session identifier

If the Identifier related standard/application field in the Generic
Identifier information element is the IPv4, and the Identifier type
field in the identifier is the Session, the identifier is the IPv4
session identifier. The format of the IPv4 session identifier is
shown in Fig. 4.2.

```
                          Bits                        Octet
            8     7     6     5     4     3     2     1    length
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                Identifier type               |
         |                = Session (0x01)              |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                Identifier length             |
         |                = 13 octets (0x0D)            |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |              Source IPv4 address             |  4
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |            Destination IPv4 address          |  4
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                    Protocol                  |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                  Source Port                 |  2
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                Destination Port              |  2
         +-----+-----+-----+-----+-----+-----+-----+-----+
```
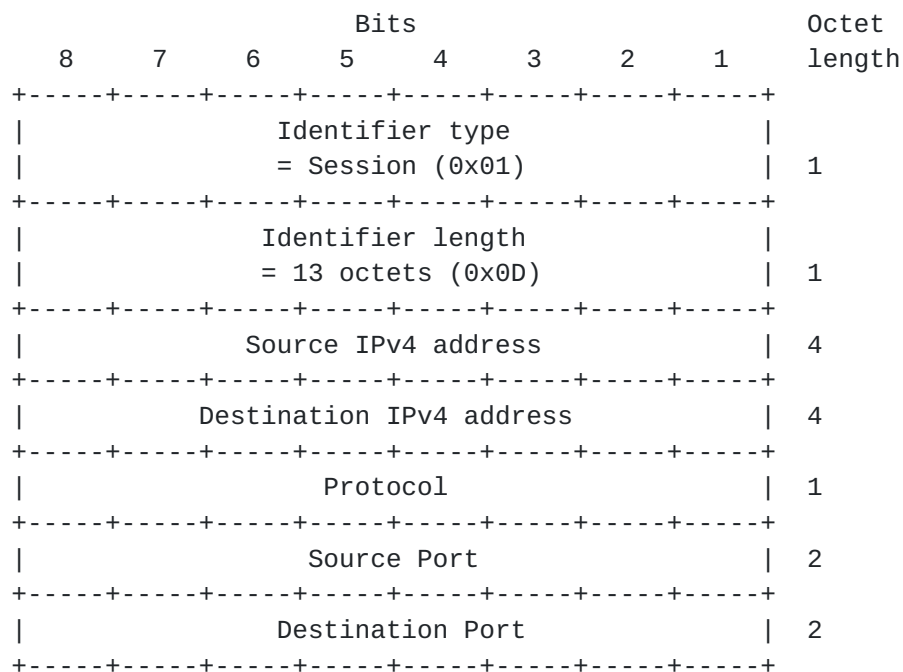
Fig. 4.2: IPv4 session identifier.

The Identifier type field is the Session (0x01).

The Identifier length is 13 octets.

The Source IPv4 address, Destination IPv4 address, Protocol, Source
Port, and Destination Port [6, 8, 9] are assigned in that order to
the Identifier value field.

Note: This specific session identifier is intended for use only with
the explicit reservation. If wild card associations are needed at a
later date, another identifier type will be used.

4.1.3 **ST2+ session identifier**

   If the Identifier related standard/application field in the Generic
   Identifier information element is the ST2+, and the Identifier type
   field in the identifier is the Session, the identifier is the ST2+
   session identifier. The format of the ST2+ session identifier is
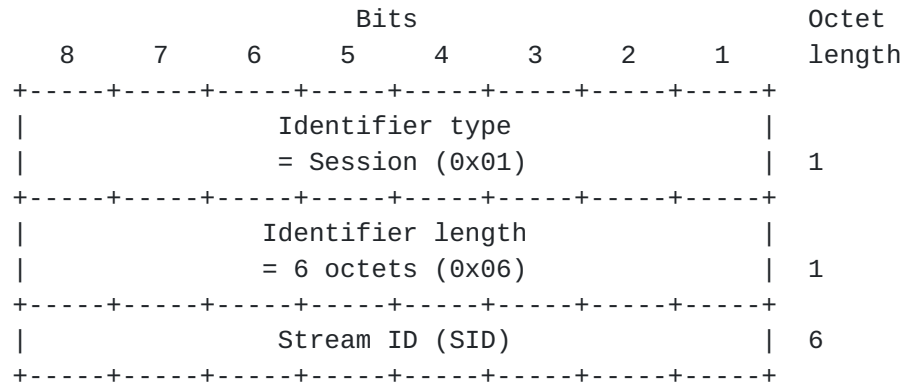   shown in Fig. 4.3.

```
                          Bits                      Octet
            8     7     6     5     4     3     2     1    length
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier type              |
          |                = Session (0x01)             |  1
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Identifier length            |
          |                = 6 octets (0x06)            |  1
          +-----+-----+-----+-----+-----+-----+-----+-----+
          |                Stream ID (SID)              |  6
          +-----+-----+-----+-----+-----+-----+-----+-----+
```

                 Fig. 4.3: ST2+ session identifier.

   The Identifier type field is the Session (0x01).

   The Identifier length is 6 octets.

   The Stream ID (SID) [10] is assigned to the Identifier value field.

4.1.4 **IPv6 session identifier**

   If the Identifier related standard/application field in the Generic
   Identifier information element is the IPv6, and the Identifier type
   field in the identifier is the Session, the identifier is the IPv6
   session identifier. The format of the IPv6 session identifier is
   shown in Fig. 4.4.

```
                        Bits                         Octet
          8     7     6     5     4     3     2     1    length
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                Identifier type               |
        |                = Session (0x01)              |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                Identifier length             |
        |                = 37 octets (0x25)            |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |              Source IPv6 address             |  16
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |            Destination IPv6 address          |  16
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                   Protocol                   |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                  Source Port                 |  2
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                Destination Port              |  2
        +-----+-----+-----+-----+-----+-----+-----+-----+
```
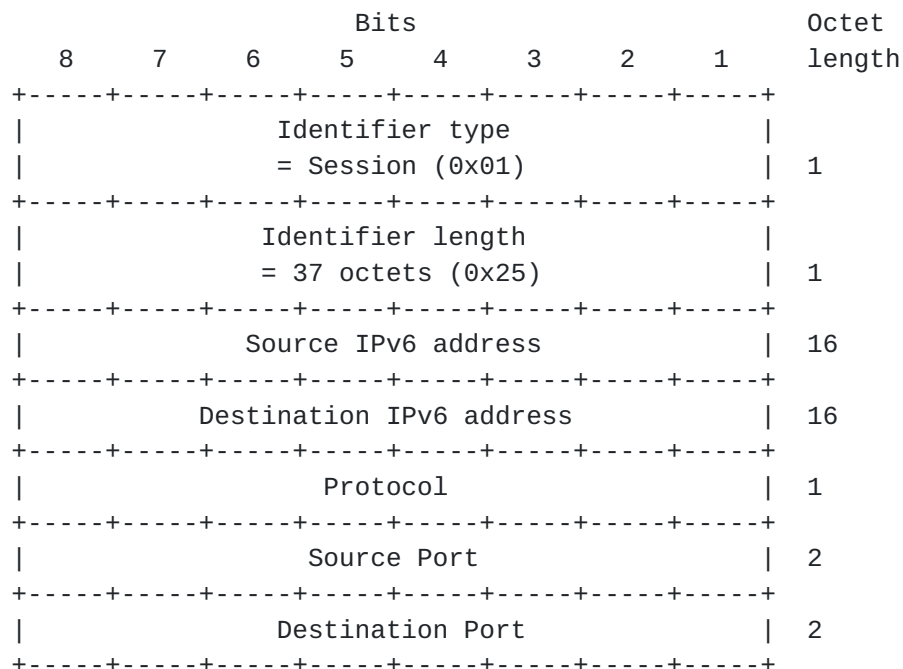
                   Fig. 4.4: IPv6 session identifier.

   The Identifier type field is the Session (0x01).

   The Identifier length is 37 octets.

   The Source IPv6 address, Destination IPv6 address, Protocol, Source
   Port, and Destination Port [7, 8, 9] are assigned in that order to
   the Identifier value field.

   Note: This specific session identifier is intended for use only with
   the explicit reservation. If wild card associations are needed at a
   later date, another identifier type will be used.

4.1.5 MPLS VCID

   If the Identifier related standard/application field in the Generic
   Identifier information element is the MPLS, and the Identifier type
   field in the identifier is the Resource, the identifier is the MPLS
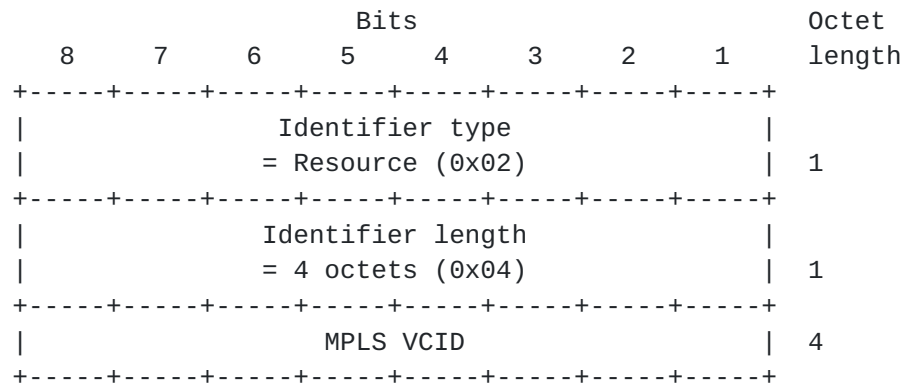   VCID. The format of the MPLS VCID is shown in Fig. 4.5.

```
                      Bits                          Octet
         8     7     6     5     4     3     2     1   length
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |               Identifier type               |
      |              = Resource (0x02)              |  1
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |               Identifier length             |
      |              = 4 octets (0x04)              |  1
      +-----+-----+-----+-----+-----+-----+-----+-----+
      |                   MPLS VCID                  |  4
      +-----+-----+-----+-----+-----+-----+-----+-----+
```

                      Fig. 4.5: MPLS VCID.

   The Identifier type field is the Resource (0x02).

   The Identifier length is 4 octets.

   The MPLS VCID [12] is assigned to the Identifier value field.

4.1.6 **Experiment/Organization specific**

   If the Identifier related standard/application field in the Generic
   Identifier information element is the IPv4, ST2+, IPv6, or MPLS, and
   the Identifier type field in the identifier is the
   Experiment/Organization specific, the identifier is the
   Experiment/Organization specific. The format of the
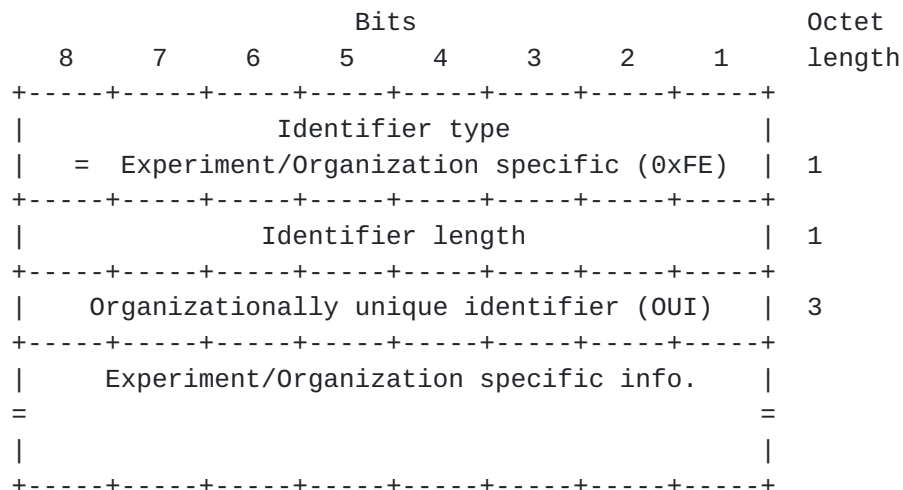   Experiment/Organization specific is shown in Fig. 4.6.

```
                         Bits                      Octet
           8     7     6     5     4     3     2     1    length
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                Identifier type              |
        |   =  Experiment/Organization specific (0xFE)  |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                Identifier length            |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |    Organizationally unique identifier (OUI)   |  3
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |     Experiment/Organization specific info.   |
        =                                             =
        |                                             |
        +-----+-----+-----+-----+-----+-----+-----+-----+
```

                 Fig. 4.6: Experiment/Organization specific.

   The Identifier type field is the Experiment/Organization specific
   (0xFE).

   The first 3 octets in the Identifier value field must contain the
   Organizationally unique identifier (OUI) (as specified in IEEE 802-
   1990; section 5.1).

4.2 **Assignment in the User-user Information Element**

4.2.1 **Use of User-to-user Signaling**

   The information field and protocol identifier assignment principle
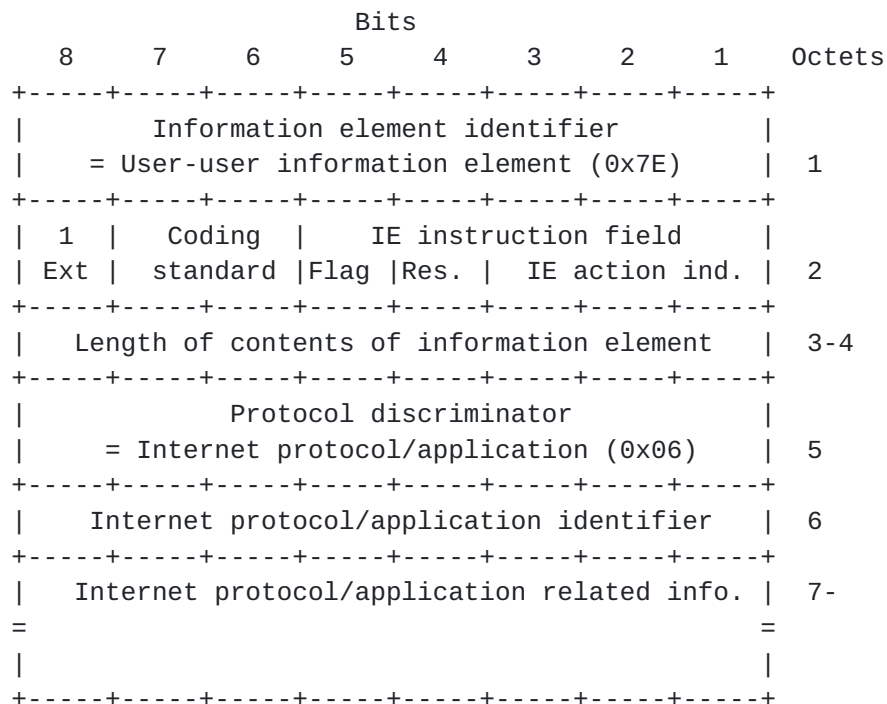   for the Internet protocol in the User-user information element is
   shown in Fig. 4.7.

```
                        Bits
           8     7     6     5     4     3     2     1    Octets
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |          Information element identifier       |
         |      = User-user information element (0x7E)    |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |  1  |   Coding  |    IE instruction field     |
         | Ext |  standard |Flag |Res. |   IE action ind. |  2
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |    Length of contents of information element   |  3-4
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |              Protocol discriminator           |
         |       = Internet protocol/application (0x06)   |  5
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |     Internet protocol/application identifier   |  6
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |    Internet protocol/application related info. |  7-
         =                                               =
         |                                               |
         +-----+-----+-----+-----+-----+-----+-----+-----+
```

   Fig. 4.7: Principle of assignment in the User-user information element.

   The Protocol discriminator field is the Internet protocol/application
   (0x06). In this case, the first 1 octet in the User information
   field is the Internet protocol/application identifier field.

   Assignment of the Internet protocol/application identifier field is
   as follows. A leading 0x means hexadecimal.

      0x00: Reserved.

      0x01: ST2+ SCMP.

      0x02: RSVP message.

      0x03-0xFD: Reserved for IANA assignment.

      0xFE: Experiment/Organization specific.

   0xFF: Reserved.

The field that follows the Internet protocol/application identifier
field is assigned to Internet protocol/application related
information that is identified by the Internet protocol/application
identifier field.

When a B-ISDN signaling message containing a User-user information
element enters an ATM network that does not support the User-to-user
Signaling, the network clears the call, discards the information
element, or discards the signaling message. (See sections 4.5.1 and
5.6.8.1 of Q.2931, section 1.9 of Q.2957, and Q.2971 annex D for
details.)

To enable reliable User-user information element transfer, when the
calling party sends a SETUP or ADD PARTY message with a User-user
information element, the CONNECT or ADD PARTY ACK message returned by
the called party must contain a User-user information element. The
called party may not respond with the same user information received
from the calling party. The calling party should confirm that the
response message contains a User-user information element.

4.2.2 ST2+ SCMP
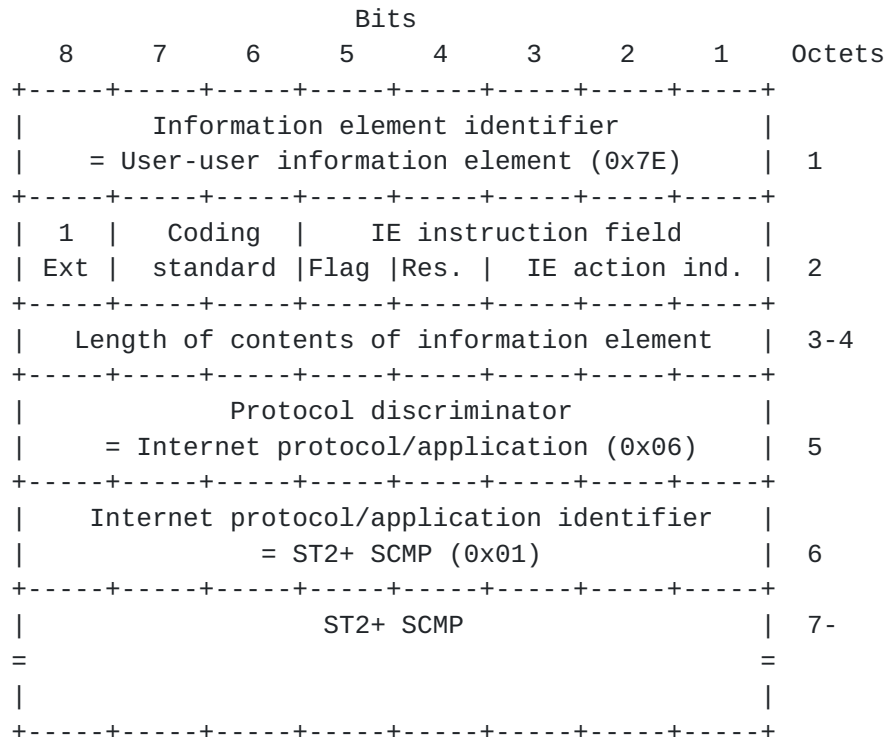
   The format of the ST2+ SCMP is shown in Fig. 4.8.

```
                         Bits
           8     7     6     5     4     3     2     1    Octets
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |          Information element identifier       |
         |       = User-user information element (0x7E)  |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |  1  |    Coding   |    IE instruction field   |
         | Ext |   standard  |Flag |Res. |   IE action ind. |  2
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |    Length of contents of information element   |  3-4
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |              Protocol discriminator           |
         |       = Internet protocol/application (0x06)  |  5
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |     Internet protocol/application identifier  |
         |                 = ST2+ SCMP (0x01)            |  6
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |                   ST2+ SCMP                   |  7-
         =                                               =
         |                                               |
         +-----+-----+-----+-----+-----+-----+-----+-----+
```

                     Fig. 4.8: ST2+ SCMP.

   The Internet protocol/application identifier field is the ST2+ SCMP
   (0x01).

   The ST2+ SCMP [10] is assigned to the Internet protocol/application
   related information field. The SETUP and ADD PARTY messages may
   contain the ST2+ SCMP CONNECT message. The CONNECT and ADD PARTY ACK
   messages may contain the ST2+ SCMP ACCEPT message. The RELEASE and
   DROP PARTY messages may contain the ST2+ SCMP DISCONNECT message.
   The RELEASE, RELEASE COMPLETE, ADD PARTY REJECT, and DROP PARTY
   messages may contain the ST2+ SCMP REFUSE message.

4.2.3 RSVP message
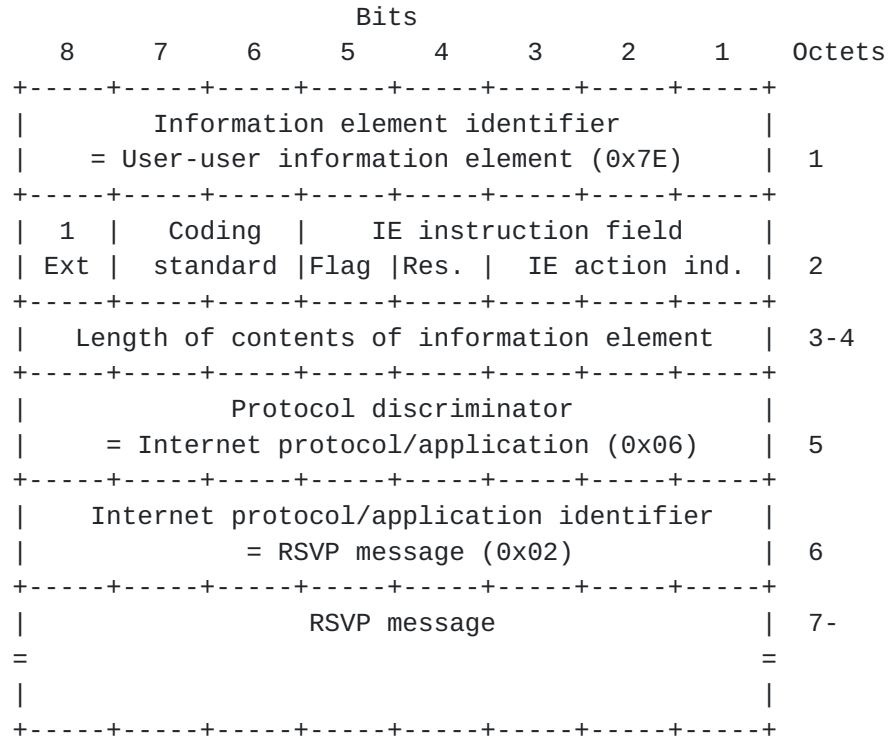
The format of the RSVP message is shown in Fig. 4.9.

```
                         Bits
          8     7     6     5     4     3     2     1    Octets
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |          Information element identifier       |
        |      = User-user information element (0x7E)   |  1
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |  1  |   Coding  |    IE instruction field     |
        | Ext |  standard |Flag |Res. |   IE action ind. |  2
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |    Length of contents of information element  |  3-4
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |              Protocol discriminator           |
        |       = Internet protocol/application (0x06)  |  5
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |      Internet protocol/application identifier |
        |               = RSVP message (0x02)           |  6
        +-----+-----+-----+-----+-----+-----+-----+-----+
        |                  RSVP message                 |  7-
        =                                               =
        |                                               |
        +-----+-----+-----+-----+-----+-----+-----+-----+
```

Fig. 4.9: RSVP message.

The Internet protocol/application identifier field is the RSVP message (0x02).

The RSVP message [11] is assigned to the Internet protocol/application related information field. The SETUP message may contain the RSVP Resv message. The CONNECT message may contain the RSVP ResvConf message. The RELEASE message may contain the RSVP ResvErr or ResvTear message.

4.2.4 **Experiment/Organization specific**

   The format of the Experiment/Organization specific is shown in Fig.
   4.10.

```
                          Bits
            8     7     6     5     4     3     2     1    Octets
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |          Information element identifier       |
         |     = User-user information element (0x7E)    |  1
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |  1  |   Coding  |    IE instruction field     |
         | Ext |  standard |Flag |Res. |   IE action ind. |  2
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |   Length of contents of information element   |  3-4
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |              Protocol discriminator           |
         |      = Internet protocol/application (0x06)   |  5
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |     Internet protocol/application identifier  |
         |   =  Experiment/Organization specific (0xFE)  |  6
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |     Organizationally unique identifier (OUI)  |  7-9
         +-----+-----+-----+-----+-----+-----+-----+-----+
         |      Experiment/Organization specific info.   |  10-
         =                                               =
         |                                               |
         +-----+-----+-----+-----+-----+-----+-----+-----+
```
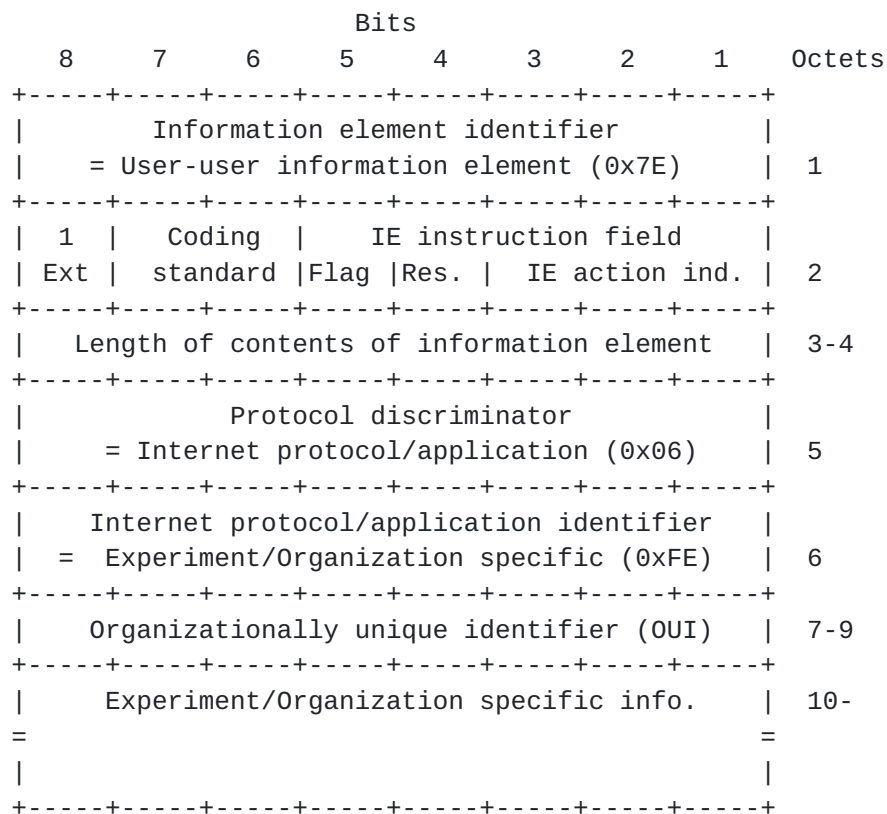
            Fig. 4.10: Experiment/Organization specific.

   The Internet protocol/application identifier field is the
   Experiment/Organization specific (0xFE).

   The first 3 octets in the Internet protocol/application related
   information field must contain the Organizationally unique identifier
   (OUI) (as specified in IEEE 802-1990; section 5.1).

5. **Open Issues**

   The following issues are still remain in this document.

   o Generic Identifier support for session aggregation.

     Session aggregation support may be needed in a backbone
     environment. Wild card style aggregated session identifier may be
     feasible. However, before specifying Generic Identifier support
     for it, session aggregation model in ATM VCs should be clarified.

   o Generic Identifier support for the IPv6 flow label and traffic
     classes.

     The IPv6 flow label and traffic classes support may be needed in
     future. However, currently their semantics are not clear.

6. **Security Considerations**

   This document specifies the information field and protocol identifier
   assignment in the Q.2941 Generic Identifier and Q.2957 User-to-user
   Signaling for the Internet protocol, so these do not weaken the
   security of the B-ISDN signaling.

   In a called party of the B-ISDN signaling, if the incoming SETUP
   message contains the calling party number and if it is verified and
   passed by the ATM network or it is provided by the network, then it
   is feasible to use the calling party number for part of the calling
   party authentication to strengthen security.

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