Secretariat:

Nederlands Normalisatie-instituut (NNI)

Kalfjeslaan 2   P.O. box 5059
2600 GB Delft
Netherlands

telephone: + 31 15 690390
telefax: + 31 15 690190
telex: 38144 nni nl
telegrams: Normalisatie Delft

ISO/IEC JTC 1/SGFS
Title: ISO/IEC JTC 1 Special Group on Functional
Standardization

Secretariat: NNI (Netherlands)

Title   : Liaison from OIW concerning Frame Relay Bearer Services
Taxonomy

Source   : OIW LLSIG

Status   :

Note   :

OIW LLSIG/92-40

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To: EWOS, AOW, ETSI-TE7
CC: SGFS (without attachment)

From: OIW LLSIG
Subject: Liaison concerning Frame Relay Bearer Services Taxonomy

Work is progressing on Implementation Agreement for Frame Relay Bearer Services. For your information, attached to this liason is the Stable Implementation Agreement voted at our June meeting. Because of this activity, it may be appropriate to consider working on taxonomy for Frame Relay related to ISO TR 10000. It is proposed that new entries be added to the 'Taxonomy of Subnetworks' (Section 5.1.1 of ISO TR 10000-2) related to 'Frame Relay Bearer Services.' The following is provided as initial basis for this work:

NEW TEXT

a b c d	Subnetwork Type
1 1 4	Semi-permanent Frame Relay Connection (Permanent Virtual Connection)
1 1 4 1	X.25 Virtual Call (VC)
1 2 4	Frame Relay Demand Connection (Switched Virtual Connection) (for further study)
6	FRAME RELAY NETWORK
6 1	Semi-permanent Frame Relay Connection (Permanent Virtual Conne~
6 1 1	X.25 DTE to DTE operation
6 1 2	Frame Relay TE1 Operation
6 2	Frame Relay Demand Connection (Switched Virtual Conn ~tion) (for further study)

The full specification of the taxonomy may depend on the method for encapsulating higher layer protocols (i.e.: above the 'core'). Work is ongoing in this area.

At this time our Frame Relay Implementation Agreement does not address the use of ISDN Bearer Services. Additional entries in the 4XX group would be needed if frame relay access to ISDN Bearer services is desired.

Note: Frame Switching service is not addressed.

7.2.7   Packet Layer

The agreements on ISO 8208 specified in 6.3 shall apply here. When ISO 8208 is used on the D-Channel, the maximum DATA packet size (i.e., actually the maximum size of the User Data Field in a DATA packet) shall be limited to 256 octets.

8   Frame Relay Subnetworks

8.1   Introduction

The following implementation agreements pertain to Frame Relay subnetworks. ~~Relevant Frame Relay protocol standards are in final stages of standardization in ANSI and CCITT.~~ These agreements are to guide implementors on optional aspects of the Frame Relay protocol standards. The following terminology is used in this clause:

- must, shall or mandatory - the item is an absolute requirement of this implementation agreement,

- should - the item is highly desirable,

- may or optional - the item is not compulsory, and may be followed or ignored according to the needs of the implementor.

8.2   Relevant Standards

Normative references relevant to Frame Relay are ~~ANS T1.606, and its addendum,~~ ANS T1.607, ANS T1.617, ANS T1.618, CCITT Q.922, and CCITT Q.9233.

Additional information relevant to Frame Relay is found in ~~ANS T1.606; its addendum in T1S1/90-175,~~ CCITT I.122, and CCITT I.233.1.

8.3   Implementation Agreements

8.3.1   Physical Layer Interface

The recommended physical layer interfaces supported by the Frame Relay network equipment are based on American National Standards and CCITT (International Telegraph and Telephone Consultative Committee) Recommendations. This clause provides a description of the recommended physical layer interfaces that may be supported by a Frame Relay equipment. Interfaces other than those listed below may be used where appropriate (e.g., ISDN, etc.). If the recommended interfaces are used, they should be used as follows:

8.3.1.1   ANS T1.403-1989

The ANS T1.403-1989, "Carrier to Customer Installation DS1 Metallic Interface" document is applicable with the following exceptions:

   a) Section 2.2 - Other Publications: The reference to CCITT, Red Book Q921 Recommendation is replaced by "CCITT, Blue Book, Volume VI - Fascicle VI.10, Recommendation Q.921, Digital Subscriber Signalling System No. 1 (DSS 1), Data Link Layer."

   b) Section 5.3.1 - Transmission Rate: The rate variation up to +/-200 bit/s is not applicable.

   c) Section 6.1 - Framing Format General: The Superframe (SF) format is not applicable.

   d) Section 6.3 - Superframe Format: This section is not applicable.

   e) Section 7 - Clear Channel Capability: The text in this section is replaced by the following: To provide DS1 Clear Channel Capability (CCC), a DS1 signal with unconstrained information bits is altered to meet the pulse density requirement of 5.6. The method lused to provide DS1 CCC is B8ZS. This method shall be used in both directions of transmission.

   f) Section 8 - Maintenance: The mention of SF format and the associated note 4 is not applicable.

   g) Section 8.1 - Yellow Alarm: Item 1 of the list (Superframe format) and associated note 5 are not applicable. In the same section; item 3 of the list, is applicable to ESF only.

   h) Section 8.3.1.1 - Line Loopback Using the SF Format: This section including note 6 is not applicable.

   i) Section 8.4.3.3 - Format of Message-Oriented Performance Report: The sentence before last: "Throughput of the data link may be reduced to less than 4 Kbit/s in some cases" is not applicable.

   j) Section 8.4.5 - Special Carrier Applications: Item 3 of the list and note 12 are not applicable.

   k) Table 2 - Superframe Format: This table is not applicable.

   l) Table 3 - Extended Superframe Format: The portion of the table "Signalling Bit Use Options" and notes related to Option T. Option 2, Option 4, and Option 16 are not applicable.

8.3.1.2   CCITT Recommendation V.35

The interface specification are:

   a) Electrical characteristics according to CCITT Recommendation V.35 Annex 1 and V.28;

   b) Connector and pin assignment according to ISO 2983;

   c) Interchange circuit defintions according to CCITT Recommendation V.24.

~~~ ~~~ ~~~ ~~~ CCITT Recommendation G702 and G704

8.3.1.3 CCITT Recommendation G.703 (2048 kbit/s)

Applicable sections of this specification are:

a) Introduction. Except those references which are to 1544 kbit/s;

b) Section 6. Interface at 2048 kbit/s;

c) Annex A. Definition of codes;

d) Annex B. Specification of the overvoltage protection requirement. In addition, when the 75 ohm interface is implemented, the transmit BNC connector shall be labeled TFC OUT and the receive BNC connector shall be labeled TFC IN.

8.3.1.4 CCITT Recommendation G.704 (2048 kbit/s)

Applicable sections of this specification are:

a) General;

b) Section 2.3. Basic frame structure at 2048 kbit/s;

c) Section 5. Characteristics of frame structures carrying channels at various bit rates in 2048 kbit/s interfaces;

d) Annex A.3. CRC-4 procedure for interface at 2048 kbit/s.

NOTE - Section 1, "General" specifies the electrical interface characteristics to be CCITT Recommendation G.703.

8.3.1.5 CCITT Recommendation X.21 (non-switched operation)

This unstructured interface uses the leased line (i.e., non-switched point to point) subset of the X.21 Recommendation. The interface specifications are:

a) Electrical characteristics according to CCITT Recommendation X.27 (V.11);

b) Connector and pin assignment according to ISO 4903;

c) Interchange circuit definitions according to CCITT Recommendation X.24.

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8.3.2   Data Transfer

Implementations shall be based on ANS T1.618. Implementation agreements on the optional parts of ANS T1.618 are proposed as follows:

8.3.2.1   Section 2.2 Flag sequence

Interframe time fill shall be accomplished by transmitting one or more contiguous HDLC flags with the bit pattern '01111110' when the data link layer has no frames to send.

8.3.2.2   Section 2.5 Frame relay information field

A maximum frame relay information field size of 1600 octets shall be supported by the network and the user. In addition, maximum information field sizes less than or greater than 1600 octets may be agreed to between networks and user at subscription time.

8.3.2.3   Section 3.3 Address field variables

See the following:

a) Section 3.3.1 Length of address field;

   1) An address field of 2 octets shall be supported. (All frames ~~with 2-octet address fields~~ must have the EA bit set to 0 in the first octet of the address field and the EA bit set to 1 in the second octet of the address field);

   2) The 3 and 4-octet address formats are outside the scope of this agreement.

b) Section 3.3.6 Data link connection identifier;

   1) The 2 octet address format shall be supported with DLCI values as defined in table 1(a);

c) Section 3.3.6.2 DLCI on the D-channel;

   1) This section is not applicable for Permanent Virtual Connections (PVCs);

d) Section 3.3.7 DLCI or DL-CORE control indicator (D/C);

   1) This section is not applicable.

Other address structure variables and their usage are as specified in ANS T1.618.

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8.3.2.4   Section 5 Congestion control

Congestion control strategy for Frame Relay is defined in ANS T1.606 Addendum 1. The following implementation agreements apply to network equipment and user equipment respectively:

a) Section 5.1 Network response to congestion

   1) Mandatory procedures of ANS T1.606 Addendum 1 shall be implemented. ~~It is recommended that~~ When implemented, rate enforcement using the DE indicator, and/or setting of the FECN and BECN indicators, should be implemented according to T1.606 Addendum 1.

b) Section 5.2 User response to congestion

   1) User equipment reaction is dependent on the protocols operating over the Data Link Core sublayer. It is recommended that the procedures of ANS T1.618 Annex A should be implemented where appropriate.

8.3.2.5   Section 6 Consolidated link layer management (CLLM) message

Use of the CLLM message is not required.

8.3.3   Control (Signaling) procedures

8.3.3.1   Permanent Virtual Connections (PVC) procedures

~~See the following:~~

~~a) User equipment (and the network) shall implement the mandatory procedures of Annex D of ANS T1.617 mandatory procedures for managing PVCs on a bearer channel that only supports PVCs. By bilateral agreement:~~

a) Managing PVCs on a bearer channel that only supports PVCs. User devices (and the network) shall implement the mandated procedures of Annex D of ANS T1.617. In addition, Annex B and optional procedures of Annex D of ANS T1.617 may also be implemented by bilateral agreement.

   1) Optional procedures of Annex D of ANS T1.617 may be ~~implemented~~ used;

   2) Annex B may be used instead of Annex D.

Implementation Note - The number of PVCs that can be supported by Annex D is limited by the maximum frame size that can be supported by the user equipment and the network on the bearer channel (e.g., when the maximum frame relay information field size is 1600 octets then a maximum of 317 PVC status information elements may be encoded in a STATUS message).

b) ~~User equipment (and the network) shall implement Annex B of ANS T1.617 for managing PVCs~~

~~on a bearer channel where switched virtual connections (SVCs) and PVCs co-exist.~~

b) Managing PVCs on a bearer channel where switched virtual connections (SVCs) and PVCs co-exist. User devices (and the network) shall implement Annex B of ANS T1.617.

8.3.3.2   Switched Virtual Connections (SVCs) procedures

The implementation agreements for SVCs will be provided later.