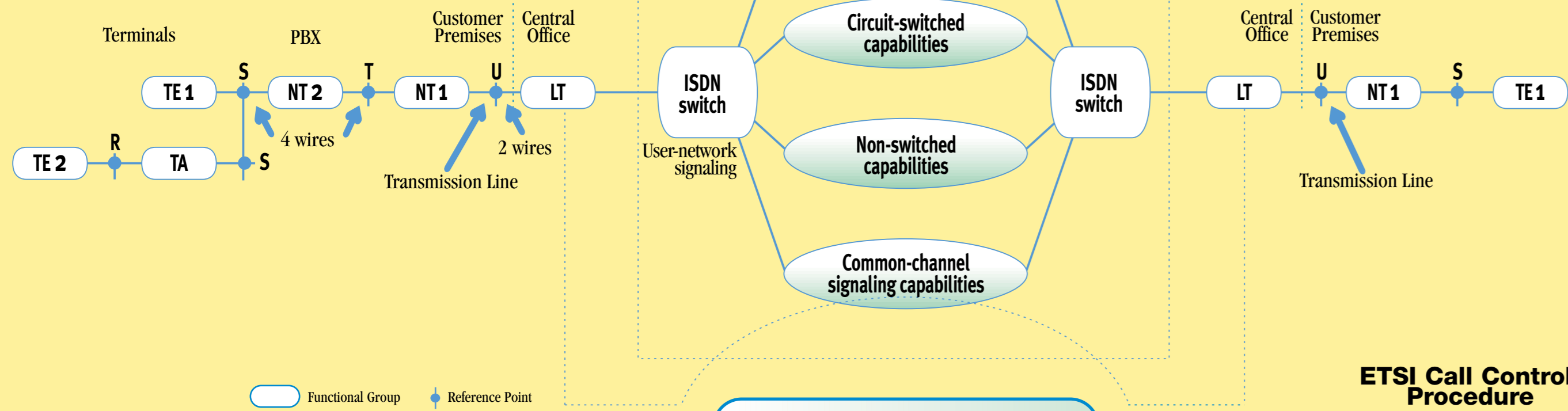


# ISDN architecture



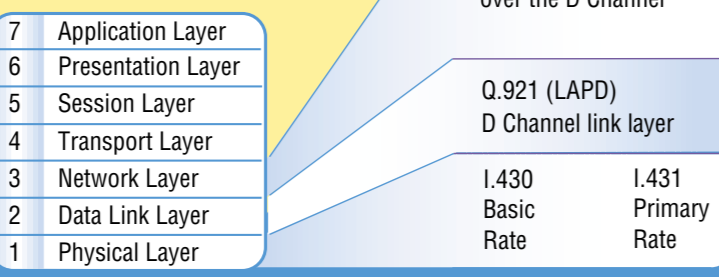
Functional Group Reference Point

## ISDN Functional Groups and Reference Points

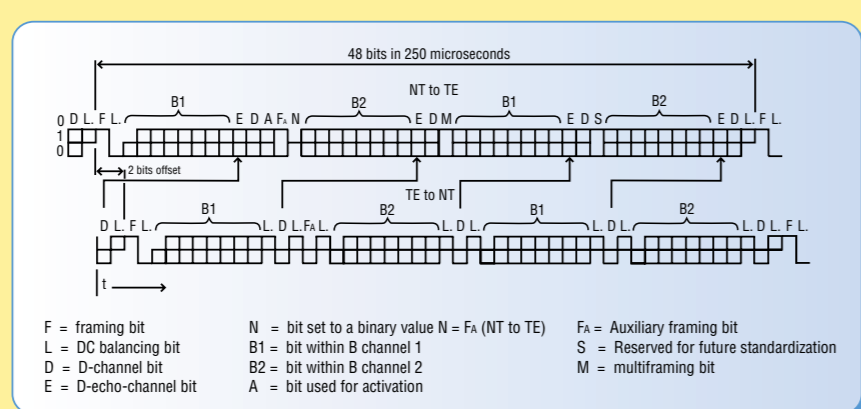
**Line Termination (LT)**  
Network Termination 1 (NT1): handles physical layer interface functions such as line termination, power transfer and timing.  
Network Termination 2 (NT2): handles function of an NT1 plus layer 2 and layer 3 functions such as multiplexing, switching and concentration.  
**Terminal Equipment 1 (TE1)**: end-user equipment such as ISDN telephones or data terminals compliant with ISDN call set up procedures and capable of interfacing directly to the S bus.  
**Terminal Equipment 2 (TE2)**: end-user equipment for non-ISDN environments (typically uses an RS232 interface).  
**Terminal Adapter (TA)**: equipment that supports ISDN call set up and provides an interface for connecting to TE2s.

## ISDN Implementation

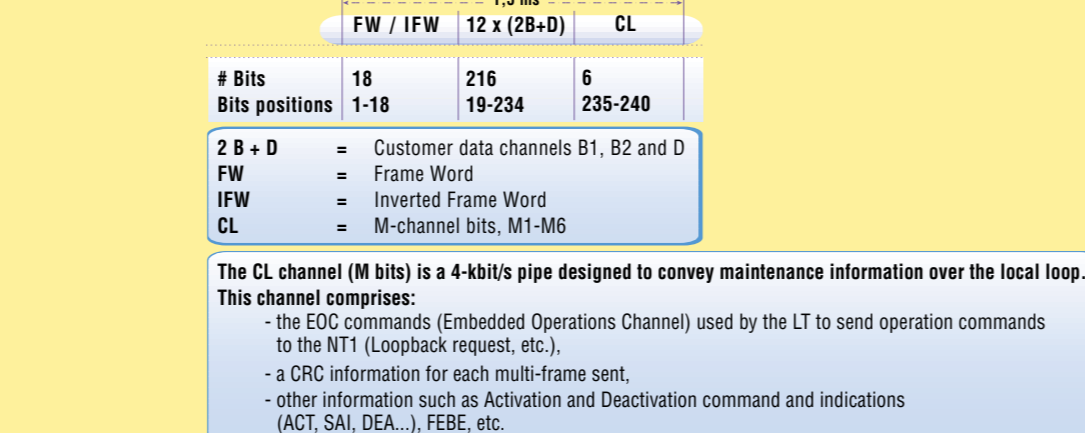
### OSI Model



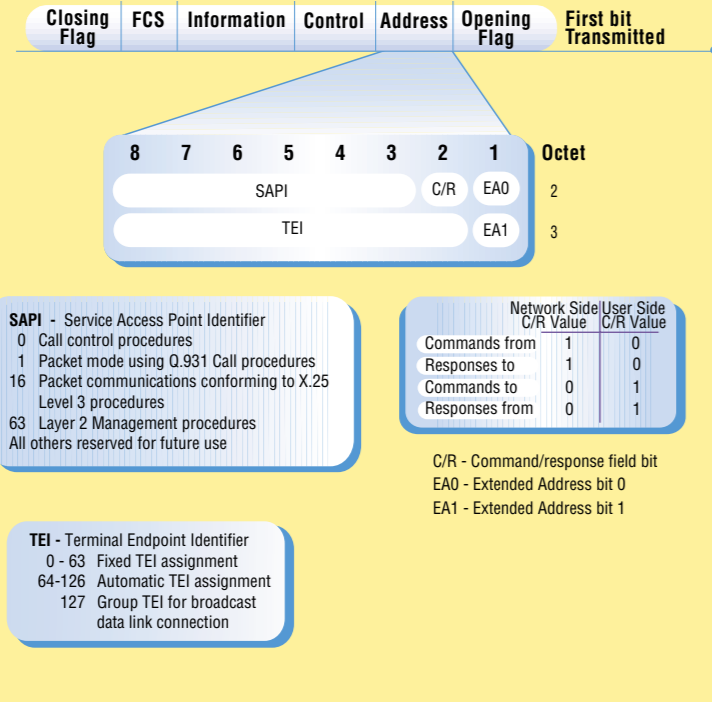
## Frame Structure at S and T Reference Points



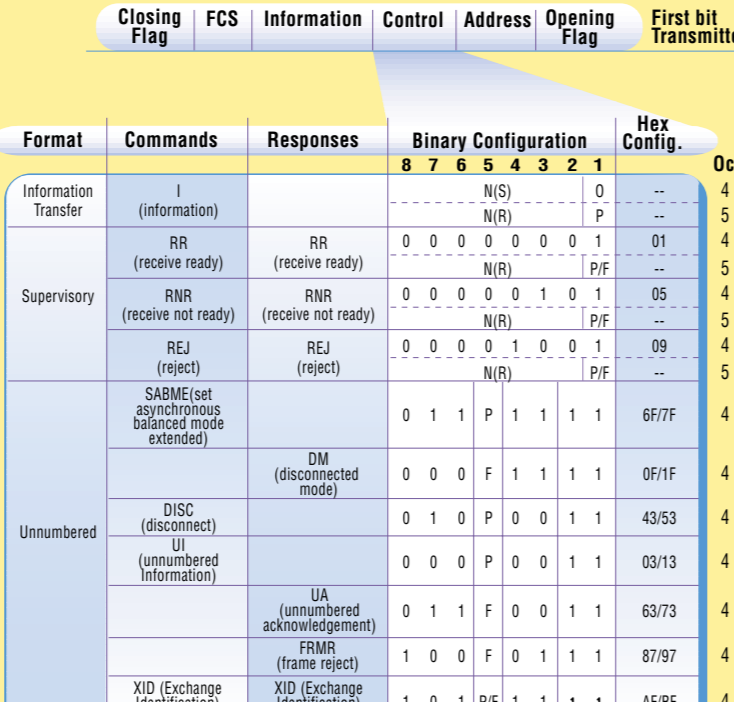
## Frame Structure at U Reference Point



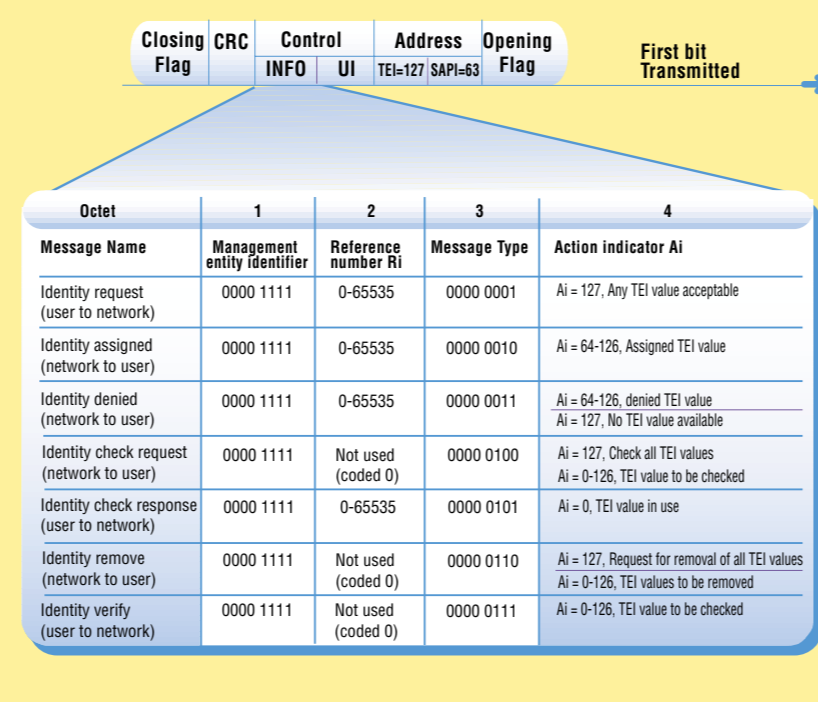
## Q.921 Address Field



## Q.921 Control Field



## Frame Structure for TEI Management



# ISDN protocols

## Layer 1

**Physical**  
Handles the physical, electrical, and procedural specifications required to transmit data across the physical medium or cables. Defines connectors, pinouts and electrical voltage and current levels. Works in units of bits.

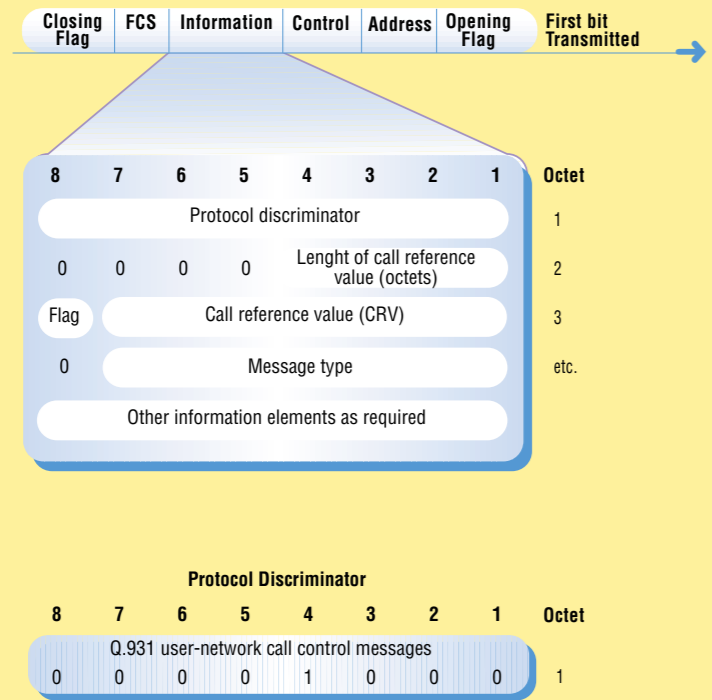
## Layer 2

**Data link**  
Frames and Addresses Packets. Provides error-free node-to-node connections and flow control. Provides mapping between Network Layer addresses. Works in units of frames.

## Layer 3

**Network**  
Addresses, switches and routes packets between hosts. Fragments and reassembles packets. Works in units of packets.

## ETSI Message Structure



## ETSI Information Element Identifier

Hex	8	7	6	5	4	3	2	1	Information Element Identifier
0	0	0	0	0	0	0	0	0	Reserved
1	0	0	0	0	0	0	0	1	Call Setup
2	0	0	0	0	0	0	1	0	Mgmt Data
3	0	0	0	0	0	0	1	1	Setup
4	0	0	0	0	0	0	1	0	Progress
5	0	0	0	0	0	0	1	1	Call Forwarding
6	0	0	0	0	0	0	1	0	Call Transfer
7	0	0	0	0	0	0	1	1	Call Forwarding
8	0	0	0	0	0	0	1	0	Call Forwarding
9	0	0	0	0	0	0	1	1	Call Forwarding
10	0	0	0	0	0	0	1	0	Call Forwarding
11	0	0	0	0	0	0	1	1	Call Forwarding
12	0	0	0	0	0	0	1	0	Call Forwarding
13	0	0	0	0	0	0	1	1	Call Forwarding
14	0	0	0	0	0	0	1	0	Call Forwarding
15	0	0	0	0	0	0	1	1	Call Forwarding
16	0	0	0	0	0	0	1	0	Call Forwarding
17	0	0	0	0	0	0	1	1	Call Forwarding
18	0	0	0	0	0	0	1	0	Call Forwarding
19	0	0	0	0	0	0	1	1	Call Forwarding
20	0	0	0	0	0	0	1	0	Call Forwarding
21	0	0	0	0	0	0	1	1	Call Forwarding
22	0	0	0	0	0	0	1	0	Call Forwarding
23	0	0	0	0	0	0	1	1	Call Forwarding
24	0	0	0	0	0	0	1	0	Call Forwarding
25	0	0	0	0	0	0	1	1	Call Forwarding
26	0	0	0	0	0	0	1	0	Call Forwarding
27	0	0	0	0	0	0	1	1	Call Forwarding
28	0	0	0	0	0	0	1	0	Call Forwarding
29	0	0	0	0	0	0	1	1	Call Forwarding
30	0	0	0	0	0	0	1	0	Call Forwarding
31	0	0	0	0	0	0	1	1	Call Forwarding
32	0	0	0	0	0	0	1	0	Call Forwarding
33	0	0	0	0	0	0	1	1	Call Forwarding
34	0	0	0	0	0	0	1	0	Call Forwarding
35	0	0	0	0	0	0	1	1	Call Forwarding
36	0	0	0	0	0	0	1	0	Call Forwarding
37	0	0	0	0	0	0	1	1	Call Forwarding
38	0	0	0	0	0	0	1	0	Call Forwarding
39	0	0	0	0	0	0	1	1	Call Forwarding
40	0	0	0	0	0	0	1	0	Call Forwarding
41	0	0	0	0	0	0	1	1	Call Forwarding
42	0	0	0	0	0	0	1	0	Call Forwarding
43	0	0	0	0	0	0	1	1	Call Forwarding
44	0	0	0	0	0	0	1	0	Call Forwarding
45	0	0	0	0	0	0	1	1	Call Forwarding
46	0	0	0	0	0	0	1	0	Call Forwarding
47	0	0	0	0	0	0	1	1	Call Forwarding
48	0	0	0	0	0	0	1	0	Call Forwarding
49	0	0	0	0	0	0	1	1	Call Forwarding
50	0	0	0	0	0	0	1	0	Call Forwarding
51	0	0	0	0	0	0	1	1	Call Forwarding
52	0	0	0	0	0	0	1	0	Call Forwarding
53	0	0	0	0	0	0	1	1	Call Forwarding
54	0	0	0	0	0	0	1	0	Call Forwarding
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56	0	0	0	0	0	0	1	0	Call Forwarding
57	0	0	0	0	0	0	1	1	Call Forwarding
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59	0	0	0	0	0	0	1	1	Call Forwarding
60	0	0	0	0	0	0	1	0	Call Forwarding
61	0	0	0	0	0	0	1	1	Call Forwarding
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72	0	0	0	0	0	0	1	0	Call Forwarding
73	0	0	0	0	0	0	1	1	Call Forwarding
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86	0	0	0	0	0	0	1	0	Call Forwarding
87	0	0	0	0	0	0	1	1	Call Forwarding
88	0	0	0	0	0	0	1	0	Call Forwarding
89	0	0	0	0	0	0	1	1	Call Forwarding
90	0	0	0	0	0	0	1	0	Call Forwarding
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109	0	0	0	0	0	0	1	1	Call Forwarding
110	0	0	0	0	0	0	1	0	Call Forwarding
111	0	0	0	0	0	0	1	1	Call Forwarding
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113	0	0	0	0	0	0	1	1	Call Forwarding
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115	0	0	0	0	0	0	1	1	Call Forwarding
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117	0	0	0	0	0	0	1	1	Call Forwarding
118	0	0	0	0	0	0	1	0	Call Forwarding
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120	0	0	0	0	0	0	1	0	Call Forwarding
121	0	0	0	0	0	0	1	1	Call Forwarding
122	0	0	0	0	0	0	1	0	Call Forwarding
123	0	0	0	0	0	0	1	1	Call Forwarding
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131	0	0	0	0	0	0	1	1	Call Forwarding
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133	0	0	0	0	0	0	1	1	Call Forwarding
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151	0	0	0	0					