Major Changes of MSR from Rev.4 to Rev.5

IEEE 802.17 Interim meeting
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Mr. Shaohua Yu, Rapporteur of Q.7/17
Shyu@fhn.com.cn

(1) Tributary Multicast can use group addresses for multicast and broadcast. 802.17 to determine if the standard has to define a primitive to support the setting/delete of a GA in the MAC or whether this is an implementation detail.

Group filtering is an implementation feature of a MAC not a standardization requirement.

(2) Topology Database Interaction MA_CONTROL.indicate is a sufficient protection trigger to X.msr as it delivers a new database on topology changes. Request for a method to get the database from the MAC on client demand. 802.17 to determine best method for achieving this (MA_CONTOL.request or some other method)

> TOPO_CHANGE.

A comment has been raised to request this change.

(3) Tributatry Based Protection requires MAC to inform X.msr of a protection events on a period basis. The draft assumes that all indications are reliable and sent once. The issue of creating a periodotic indication (that repeats until acknowledged) is an implementation detail. This may require a recommendation added to the draft that the MAC periodically sends the current protection status and database until the client has sent back a confirm.

> One or more opcodes (receptionStatus, serviceClass, topochange, protchange) are used to indicate thie event to client (XP).

(4) Broadcast Network - single fiber uni-directional may be supported by 802.17 depending on topology/protection mechanisms being disabled. MA_DATA.request is currently specified to allow a packet to be sent with Wrap Disable, Protection Disable, and Steering Disable by explicitly requesting a particular ringlet with no protection.

Requires further study to determine if other MAC mechanisms would prevent this request from being fulfilled.

See 5.3.1.2 parameters, ringletID and MACProtection. This allows the client to set which ringlet the packet is placed on and turns off protection (protectionDisable). Therefore, the WE bit will not be set (wrapdisable) and the ringlet is selected (steering disable)

(5) Need to provide specification for Manual Protection Switch invocation

The invocation of manual protection switches is done through the LME. Right now the editor of the OAM clause indicates that the SNMP MIB has variables to force a manual switch. However, any implementation may set the manual and forced switches through proprietary interfaces to the LME (in other words you don't have to use SNMP).

(6) Plug and Play versus Pre-planned. RPR actually does both, Plug and play operation guarantees that topology / protection works automatically. The LME system allows the provisioning of bandwidths to be done.

Due to the use of Tributary Cross Connection Relationship (TCCR), it is particularly burdensome during project installation if we use Plug-and-play. So only pre-plan is supported for this Recommendation. Plug-and-Play will be studied in next Recommendation.

(7) Need Fairness Algorithm (FA) of MAC to support services of Class B and C.

OK

(8) Support for both local address and OUI MAC addresses. (*MAC address will be sent from MAC layer*.)

If X.mse uses 32-bit address (MAC address) still, the address field length is 4 bytes not 6 bytes. If X.msr uses 48-bit address, the local address will be overlapped to MAC address specified in OUI MAC address. It may violate interworking between RPR with OUI address and RPR with a local address.

(9) Client needs the following additional opcodes: the supported floodingForm (FF) (bi-directional or uni-directional), pastSource (PS), strictOrder (SO), remote forwarding, single-queue / dual-queue (primary or secondary), various shaper opcodes and chosen center wrap / edge wrap for the data path.

The supported fairness algorithm, including each station in proportion to its relative weight, unused bandwidth, single-choke, multi-choke, basic status, variables and parameters of FA. A sub-clause in section 9 (FA) is needed to describe interface to client.

Need to discuss with you at this Dallas meeting.

A comment has been raised to request FF be part of MA_DATA.indicate

(10) Annex added to current draft of P802.17.

Do not need an annex. Instead clause 5 will reflect X.msr as a potential client layer and a reference in our bibliography will be given

(12) Dr. David James to contact IEEE 802 RAC and provide some helps for Ether-type public codes assignment of X.msr-rpr. After checking IEEE web page, 0x88b5 and 0x88b6 may be two candidates.

Maybe it is ok.

(11) Add X.85/Y.1321 (IP over SDH using LAPS) as a SONET/SDH Physical Layer and Reconciliation layer. Requires a liason letter to ITU SG17 TSB for a new SAPI value for RPR.

Need some sentences to describe this well and merge "Flag delineated, byte synchronous framing." and X.85 together. If LCP (Link control protocol, including 10 configuration packets, 16 events and 12 actions) does not been used, the frame format and procedure of said byte synchronous framing is the same as that of X.85.

X.85 (LAPS) is connection-less point-to-point protocol with byte synchronous framing .

Supported Topologies of MSR

- Two-fibre ring
- Link
- Link with add and drop
- Broadcast network
- Possible Others

Interface to RPR MAC (1/6)

MA_DATA.request {

destinationAddress,

sourceAddress [optional],

mSDU,

serviceClass,

ringletID [optional],

macProtection [optional],

markFE [optional],

strictOrder, [optional]

extendedFrame [optional] }

Interface to RPR MAC (2/6)

MA_DATA.indication {

destinationAddress,

sourceAddress [optional],

mSDU,

receptionStatus,

ringletID,

serviceClass,

fairnessEligible,

strictOrder,

extendedFrame }

Interface to RPR MAC (3/6)

MA_control.request {

opcode,

request_operand_list }

Table 5.2—Control request opcodes

Opcode name	Meaning	Operands	Specified in
OamEcho Req	Request to transmit echo request frame	echo request parameters	12.3.1
OamFlushReq	Request to transmit flush frame	flush parameters	12.3.2
all others	TBD	—	—

Interface to RPR MAC (4/6)

MA_control.indication {

opcode,

indication_operand_list }

Table 5.3—Control indication opcodes

Opcode name	Meaning	Operands	Specified in
OamEchoInd	Receipt of echo reply frame	echo payload and parameters	12.3.1
OamFlushInd	Receipt of flush frame	flush payload and parameters	12.3.2
TopoChange	Topology change	topology and status database	10.2.6
ProtChange	Protection change	topology and status database	10.2.6
sendA	sendA change	true/false, ringletID	6.6.2
sendB	sendB change	true/false, ringletID	6.6.2
sendC	sendC change	TTL_to_congestion, ringletID	6.6.2
ScFcmInd	Receipt of SC-FCM	allowed_rate, allowed_rate_congested, TTL_to_congestion, ringletID	9.6.4
McFcmInd	Receipt of MC-FCM	sourceAddress, TTL, fairnessMessageType, controlValue, ringletID	9.6.4
all others	TBD	—	—

Interface to RPR MAC (5/6)

MA_UNITDATA.request {frame_type,

mac_action,destination_address,

source_address,

RIF,mac_service_data_unit

user_priority,access_priority

ringletID,MACProtection

markFE,receptionStatus

fairnessEligible,frame_check_sequence }

Interface to RPR MAC (6/6)

MA_UNITDATA.indication {frame_type,

mac_action,destination_address,

source_address,

RIF,mac_service_data_unit

user_priority,access_priority

ringletID,MACProtection

markFE,receptionStatus

fairnessEligible,frame_check_sequence }

X.85/Y.1321 (IP over SDH using LAPS) introduction

1、Delay contribution from August 1998

2、It was acceptable by ITU-T SG7(Data network and Open System Communication) at the September meeting, 1998

3、X.85/Y.1321 on IP over SDH using LAPS was determined at the June 1999 meeting

4、Recommendation X.85/Y.1321) was approved at March 2000 meeting

International comments to ITU-T SG7(Data Network and Open system communication)

1、IETF

2、ITU-T SG15 (Optical and other transport networks)

3、ITU-T SG11 (Signaling requirements and protocols)

4、ITU-T SG13 (Multi-protocol and IP-based networks and their internetworking)

6、Lucent

6、Nortel

7、NTT

8、Juniper

9、Swisscom

10、Lots of email from Vendors and Carriers

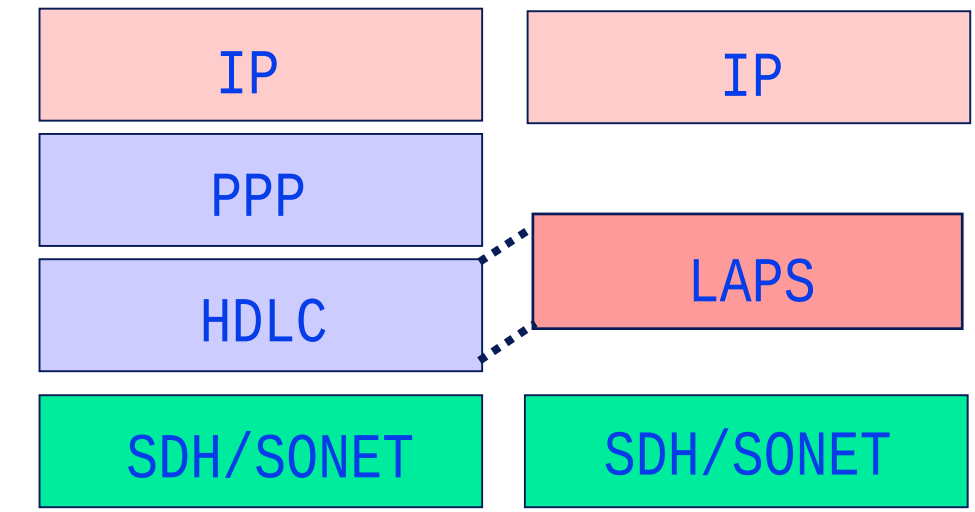
What is X.85 benefit

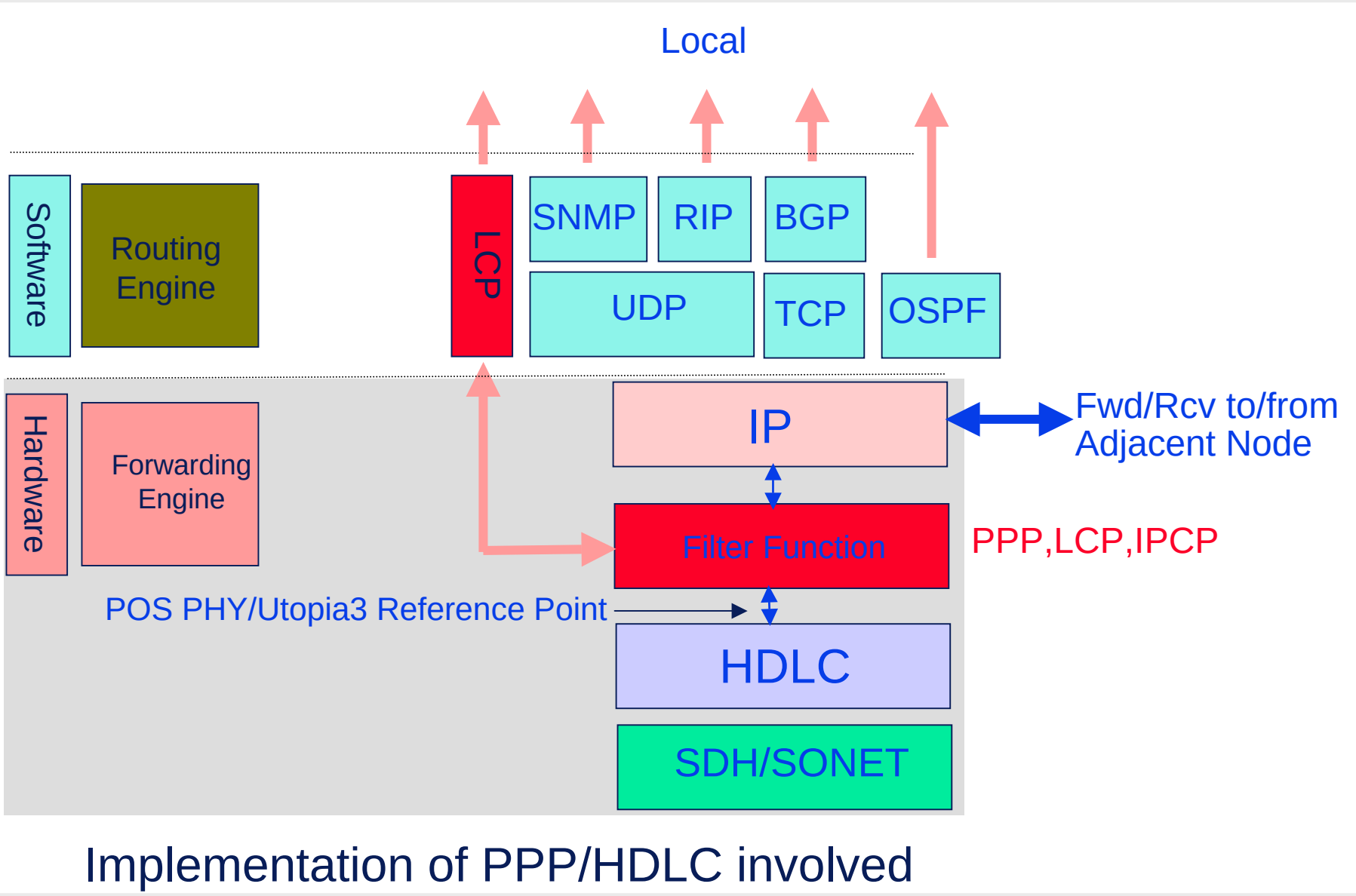
1、Simple implementation

2、Function equivalent to PPP/HDLC

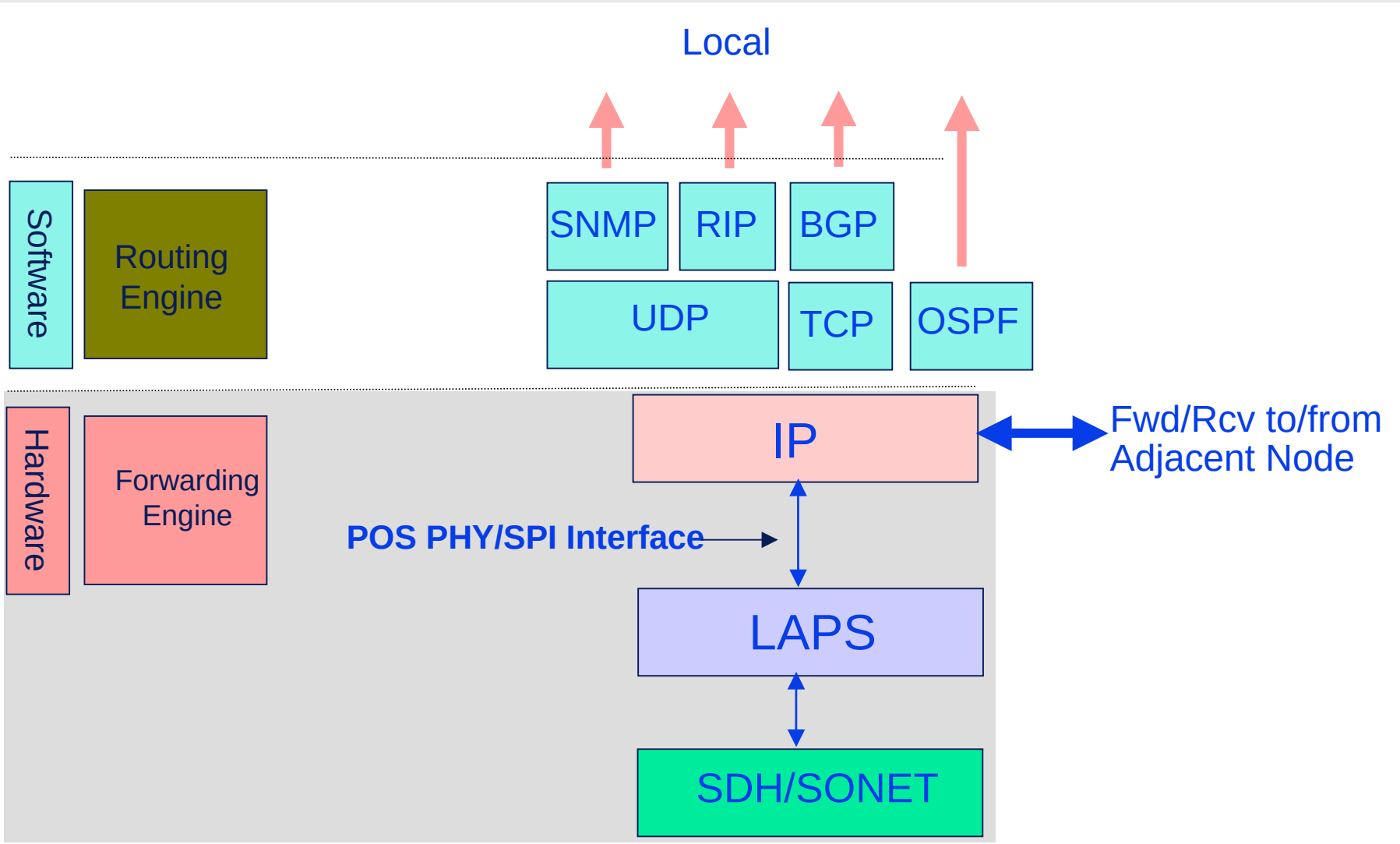
3、Performance of Carrier concern

4、Compatibility with PPP/HDLC


IP
PPP
HDLC
SDH/SONET
IP
LAPS
SDH/SONET
PPP over SDH/SONET
IP over SDH



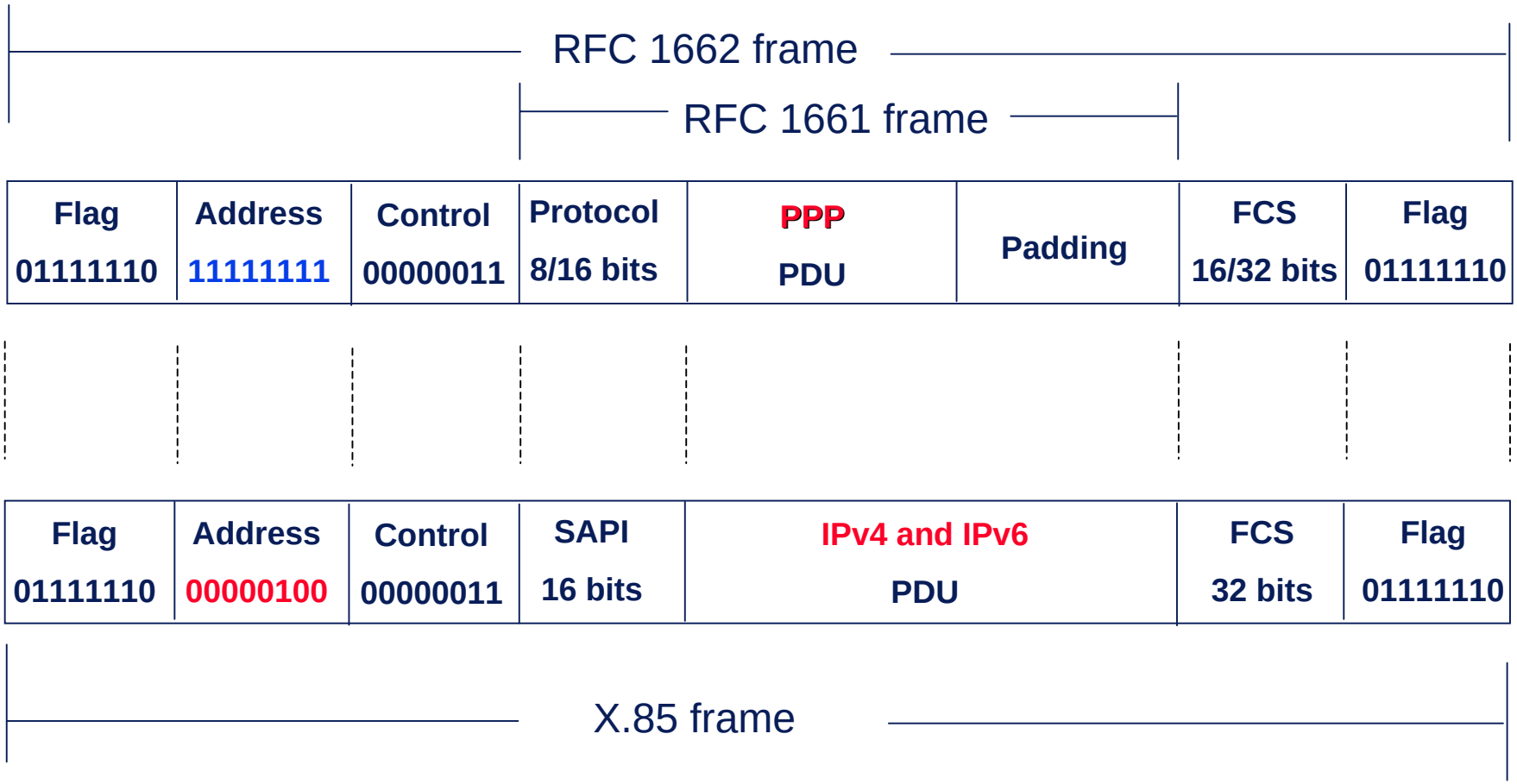
Implementation of PPP/HDLC involved



Implementation of X.85 involved

- The major objective of X.85 is to remove PPP protocols including LCP and IPCP in POS application.
- LCP contains 10 configuration packets,16 events, and 12 actions.

X.86 vs. RFC 2615



X.85 vs. RFC 2615

PPP/HDLC：RFC 1661

RFC 1662

RFC 1570

RFC 1547

RFC 1340

SNMP & MIB

X.85

SNMP & MIB

LAPS or POS HDLC Framer/Deframer functions:

T

Insertion of HDLC frame into the SPE
Framing,
Inter-frame fill and transmit FIFO error recovery.
Scrambling (X**43 +1),
Transparency processing
generate a 16/32 bit FCS.

R

Extraction of HDLC frame,
Transparency removal,
De-scrambling (if enable),
FCS error checking,
Optional delete the HDLC address and control fields.

Protocol states

RFC 2615：2+137

LAPS (X.85)：2

What is X.85 benefit

1、Simple implementation

2、Function equivalent to PPP/HDLC

3、Performance of Carrier concern

4、Compatibility with PPP/HDLC

	RFC 2615（PPP/HDLC）	LAPS
Protocol encapsulation	yes	yes
Inter-frame fill	yes	yes
Scrambling	yes	yes
Transparency	yes	yes
FCS	yes	yes
Link status monitoring	Yes	yes
Configuration Req./Ack/Nak	yes（padding function）	
Terminate Req./Ack	yes（but it is seldom used）	
Protocol Reject	yes（but it is seldom used）	
Echo Req./Reply	yes	yes in SDH
Discard Req.	yes（but it is seldom used）	

What is X.85 benefit

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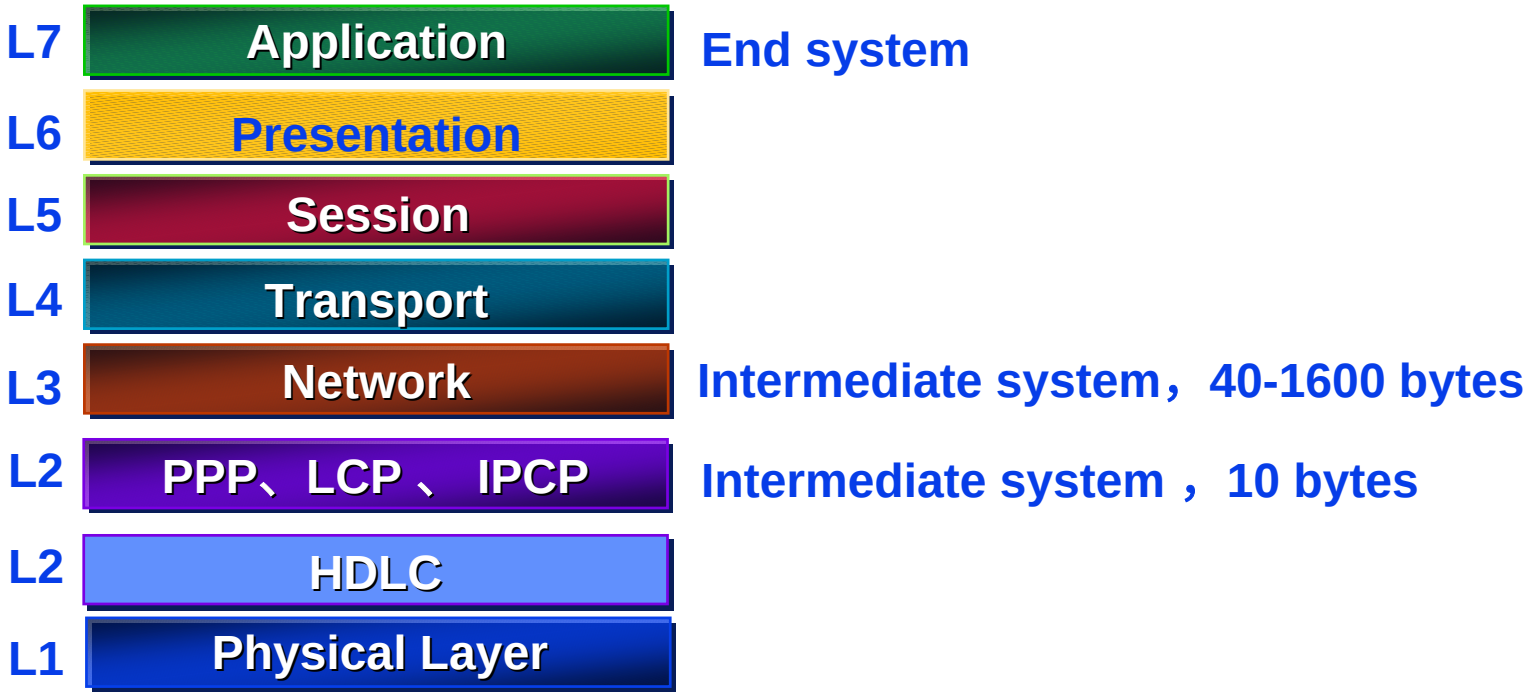


Open System Interconnection

	RFC 2615(PPP/HDLC)	LAPS	Cell based
MPS/mPS	1600/10=160	1600/40=25	1
Latency	> 8 μs +80 μs + NP > 8 μs +400 μs + NP > 8 μs +4000 μs + NP > 8 μs +16000 μs + NP	NP	NP
Latency variance	4 times	a value	good

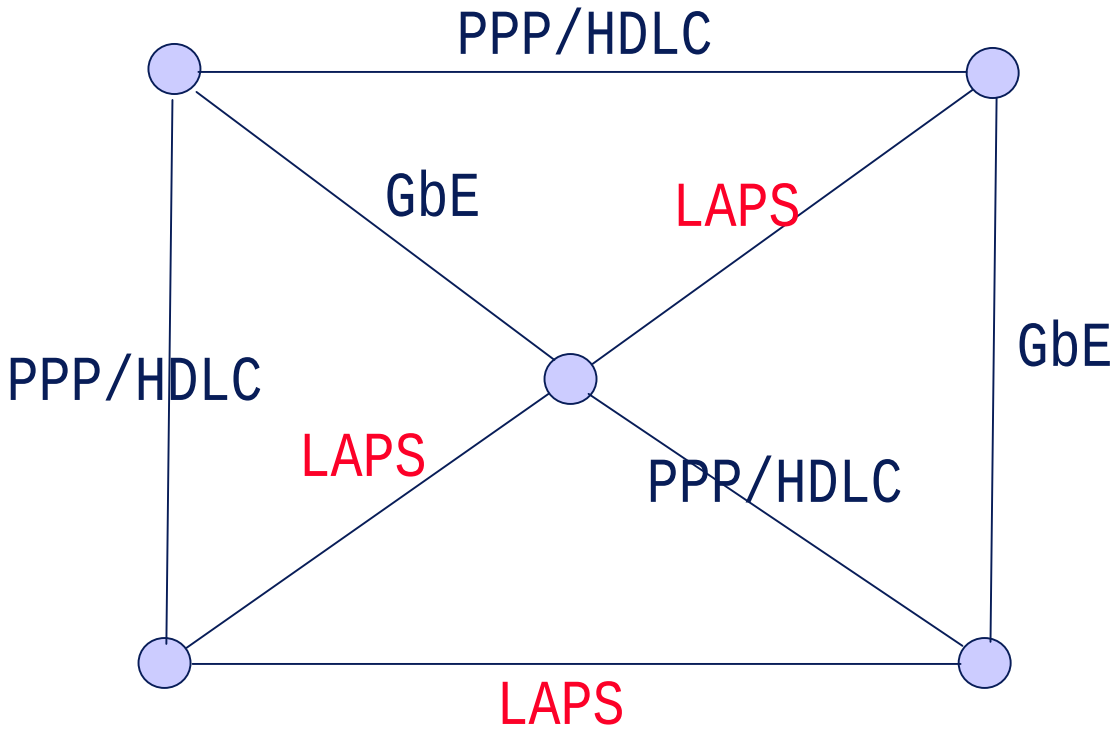
What is X.85 benefit

1、Simple implementation

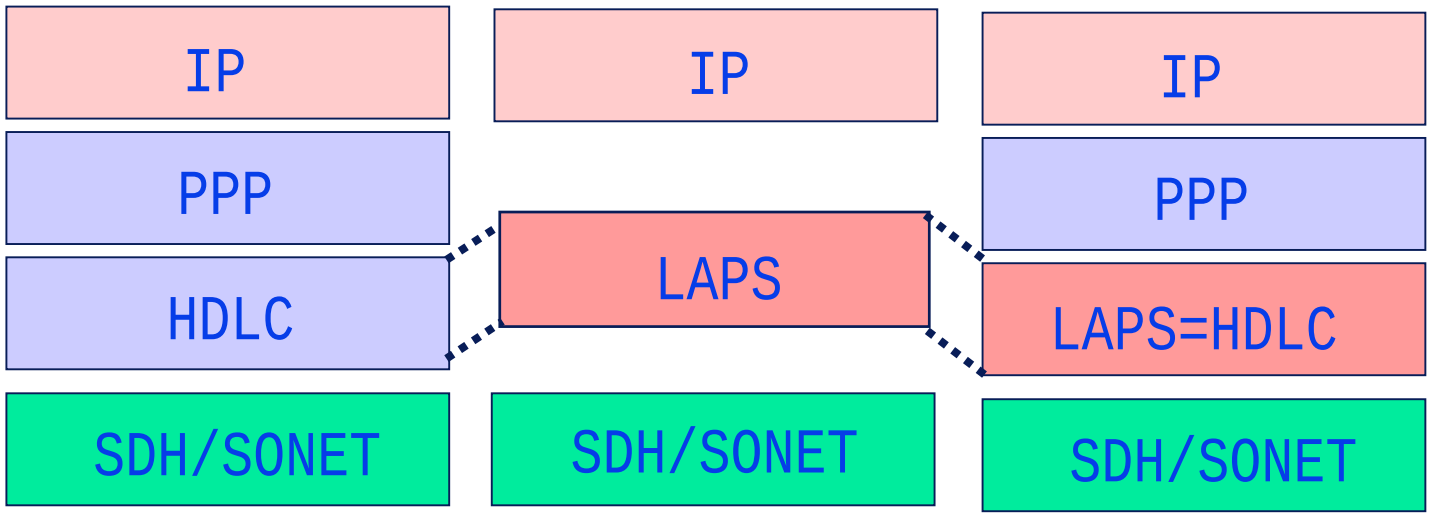
2、Function equivalent to PPP/HDLC

3、Performance of Carrier concern

4、Compatibility with PPP/HDLC

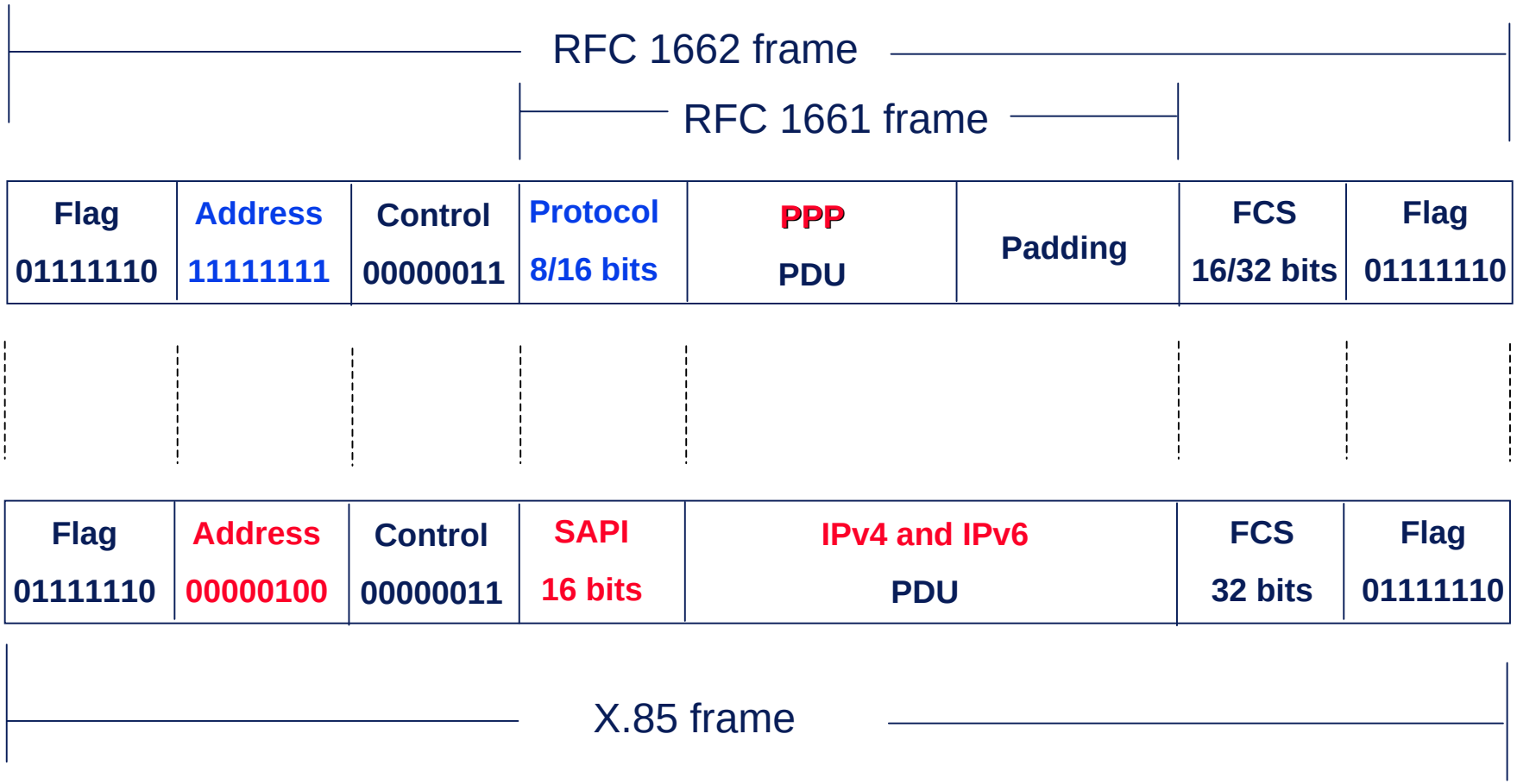

PPP/HDLC
GbE
LAPS
PPP/HDLC
GbE
LAPS
PPP/HDLC
LAPS

How LAPS compatible with PPP/HDLC



PPP over SDH/SONET IP over SDH PPP over SDH using LAPS

X.86 vs. RFC 2615



When the PPP is used to be encapsulated via SAPI for the compatibility with RFC 2615, it is noted:

(1)Regarding the path signal label (C2) of SDH, for compatibility with RFC 2615, the signal label value of (x^{43} + 1) scrambling is changed from 24 (18 hex) to 22 (16 hex). Additionally, the LAPS does also provide the signal label value 207 (CF hex) to indicate PPP without scrambling.

(2)Used to SPI/POS PHY interface

X.86 introduction

1、Delay contribution from May 1999

2、It was acceptable by ITU-T SG7(Data network and Open System Communication) at the June meeting, 1998

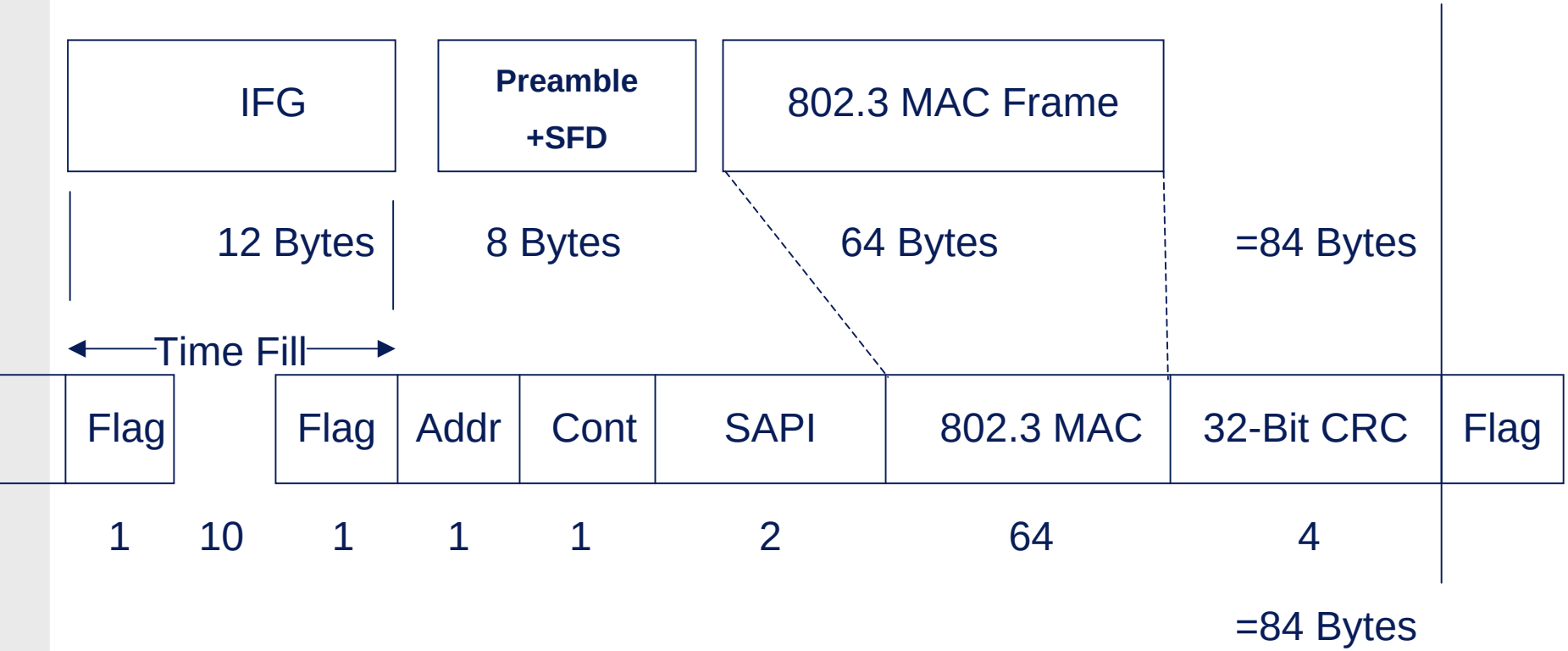
3、X.86 on Ethernet over LAPS was determined at the March 2000 meeting

4、Recommendation X.86 on Ethernet over LAPS was approved at Feb. 2001 meeting

The competitive advantages of X.86

- Remote Trail Performance Monitoring
- Remote Fault Indication
- IEEE802.3x – Active Flow Control in Burst Traffic Condition
- Low Price and Ease of Use (Compared to LANE)
- Low Latency and Low Latency Variance
- 1+1 redundancy based Ethernet and Gigabit Ethernet service
- Target at existing telecom transport resources

X.86 does match Ethernet and Gigabit Ethernet very well



ASIC Latency Measurement, X.86 vs GFP

	GFP	LAPS/X.86	Percentage
64bytes	10.520 μs	9.658 μs	8.9%
1518bytes	203.620 μs	133.967 μs	51.9%
9.6Kbytes	Not supported	769.567 μs	

Note: Data comes from HDMP-3001, Agilent and WRI joint development

Thank you