Broadband Inter-Carrier Interface (B-ICI)

Raj Jain

Professor of Computer and Information Science
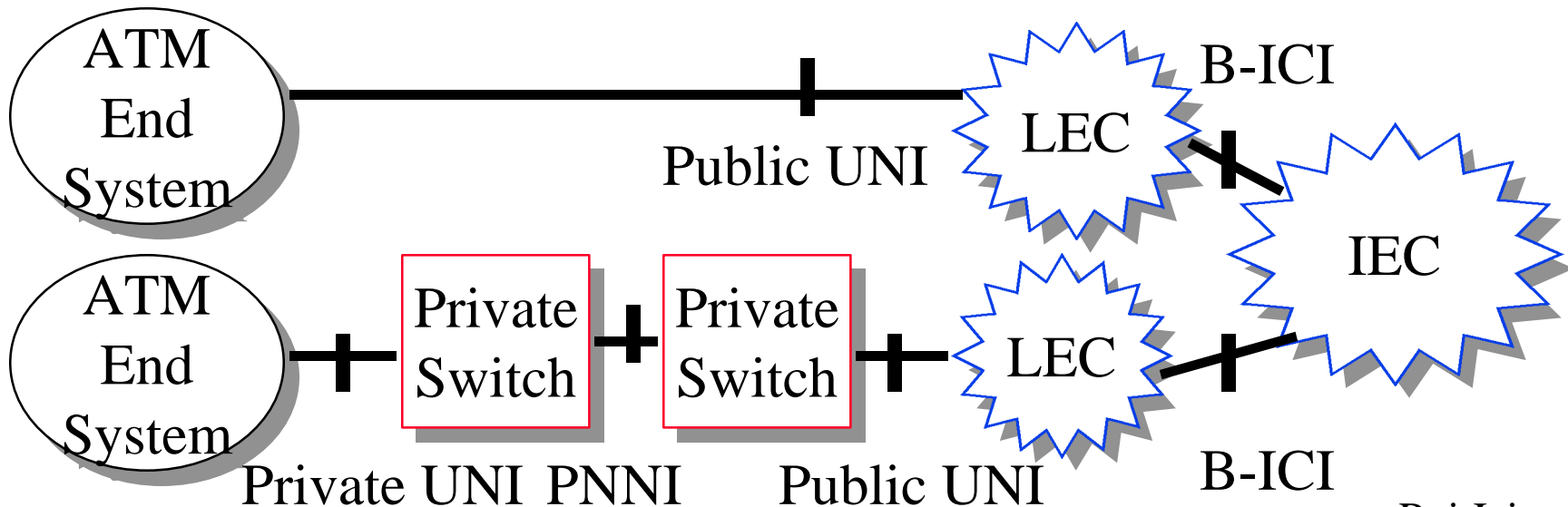
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Overview

- ❏ What is B-ICI?
- ❏ SS7 Signaling and BISUP
- ❏ NNI Signaling
- ❏ Interworking:
  - ❏ Circuit emulation services
  - ❏ Frame relay
  - ❏ SMDS

What is B-ICI?

❏ B-ICI = Public Network-to-Network Interface

❏ Public network= Local exchange carrier (LEC), Independent Local Exchange carrier (ILEC), Inter-exchange carrier (IEC)

❏ B-ICI ≠ PNNI: Public carriers may not allow PNNI functions such as advertising, routing DTLs

ATM End System

Public UNI

LEC

B-ICI

IEC

ATM End System

Private Switch

Private Switch

LEC

Private UNI PNNI
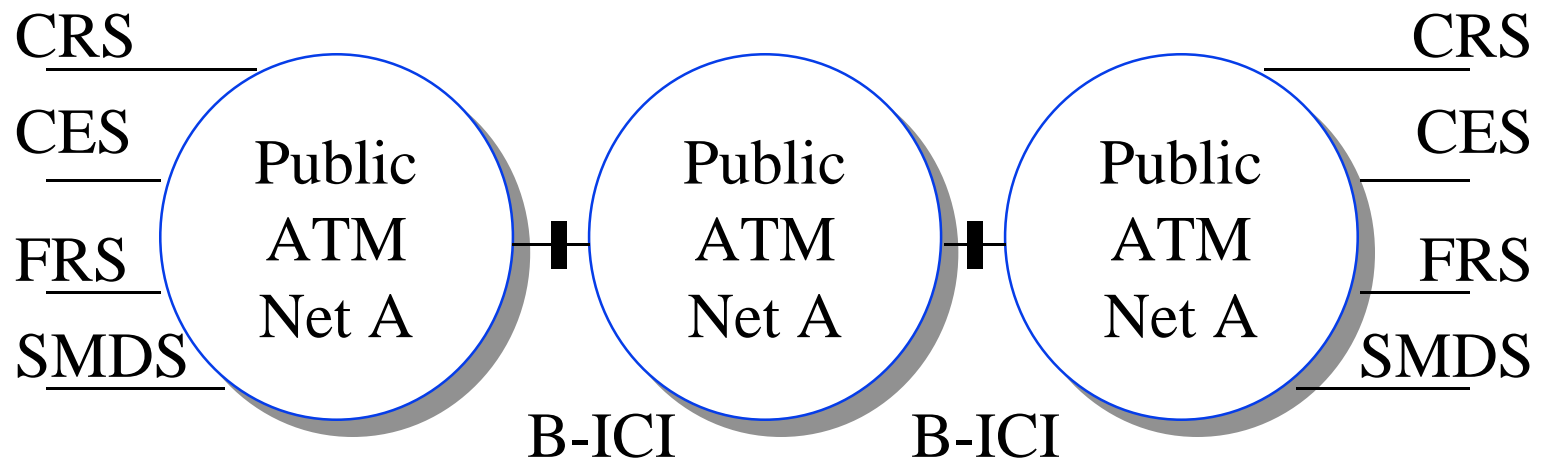
Public UNI

B-ICI

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B-ICI: Key Features

- ❑ Based on Broadband ISDN User Part (B-ISUP) signaling messages and parameters

- ❑ Static routing based on E.164 addresses

- ❑ Point to point and multipoint connections (in V2.0)

- ❑ Supports UNI 3.1 QoS classes 0 through 4

- ❑ Allows end-to-end carriage of NSAP addresses

- ❑ Provides traffic data collection: ingress and egress cell counts

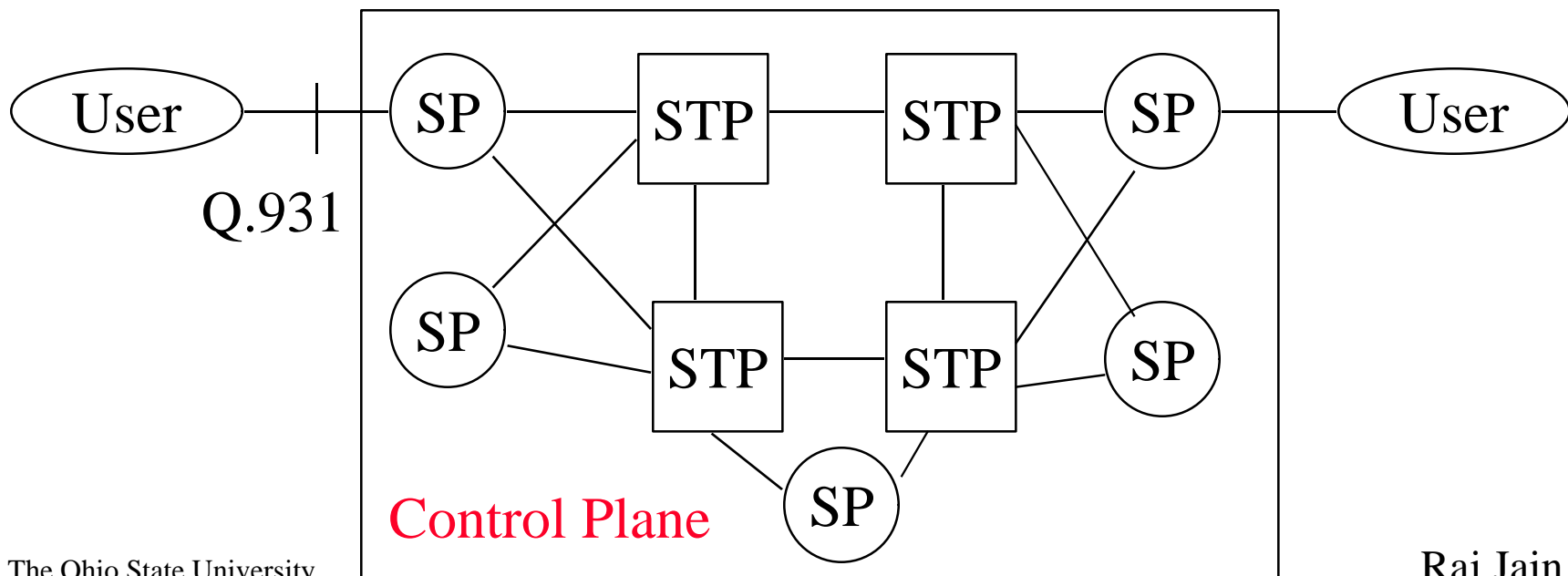- ❑ Provides traffic management and network performance

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B-ICI: Key Features (Cont)

❑ Supports cell relay service (CRS), Circuit emulation services (CES), frame relay service (FRS), switched multi-megabit service (SMDS)
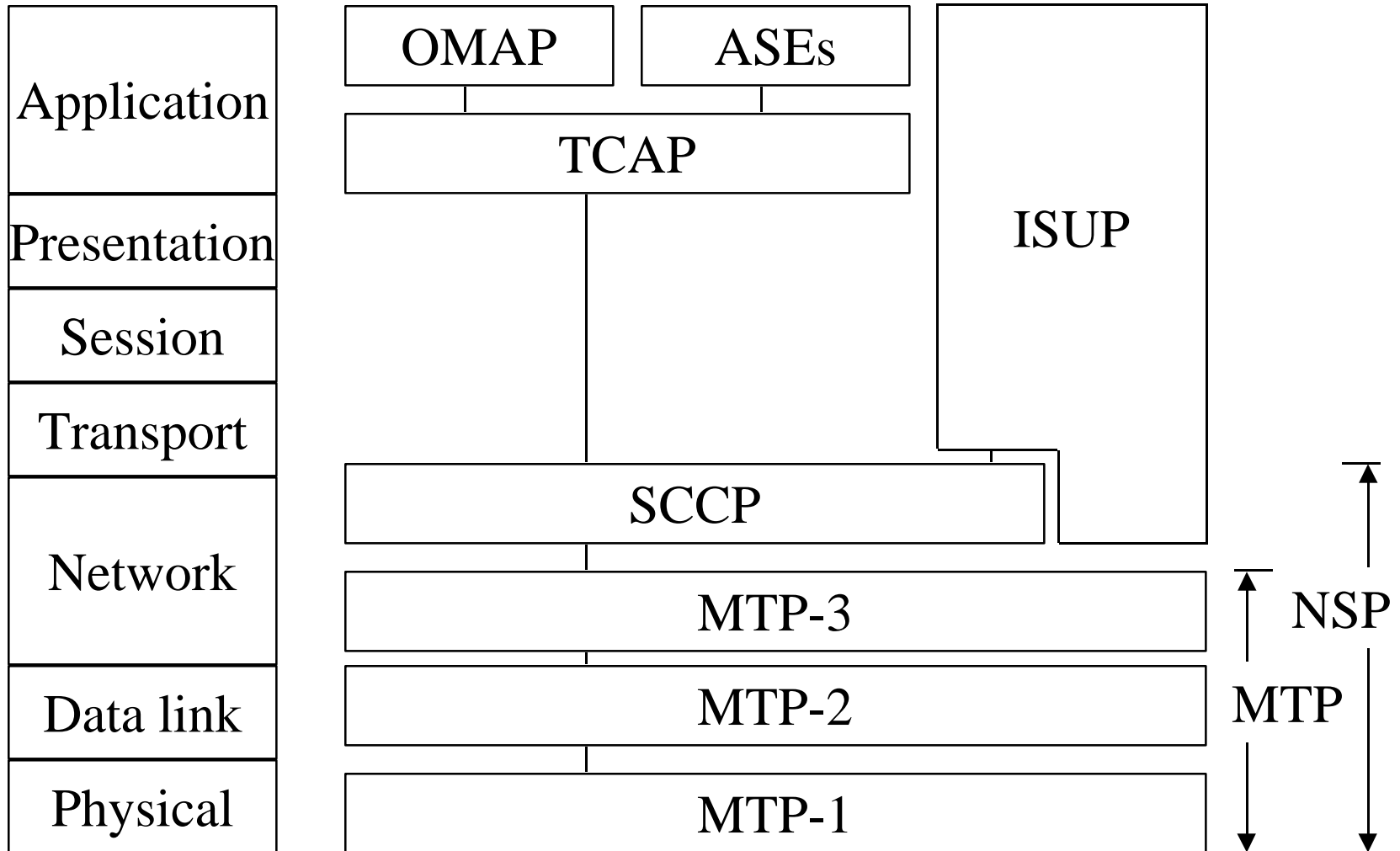
CRS   CRS

CES   Public   Public   Public   CES

FRS   ATM   ATM   ATM   FRS

SMDS   Net A   Net A   Net A   SMDS

B-ICI   B-ICI

SS7

- Also known as Common Channel Signaling 7
- Separate signaling network of STPs
- STP = Signaling transfer points (can route sig messages)
- Signaling point (SP): Can handle SS7 control messages

SS7 Protocol Architecture

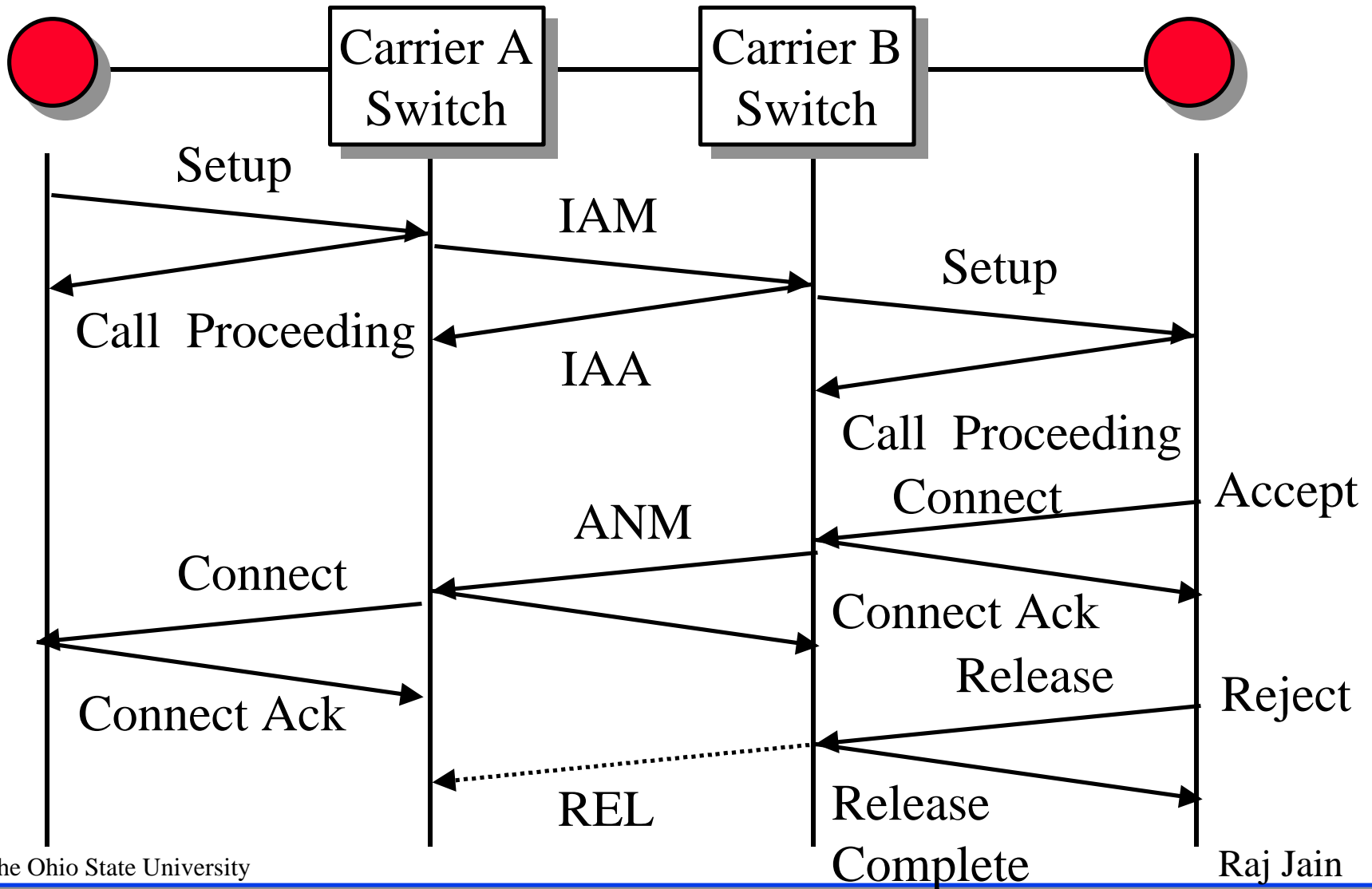|			
Application	OMAP	ASEs	ISUP
	TCAP		
Presentation			
Session			
Transport			
Network	SCCP		
	MTP-3		NSP
Data link	MTP-2		MTP
Physical	MTP-1		

SS7 Protocol Architecture

❑ Q.931 specifies the control messages from user to network

❑ SS7 specifies the mechanisms (services and protocols) inside the network

❑ Reliable transport is provided by MTP (message transfer part)

❑ Signaling connection control part (SCCP): Routes messages using logical addresses. Also supports duplications of databases.

❑ SSCP+MTP=Network service part

SS7 User Parts

- Separate user parts for different services:
  - Telephone user part (TUP)
  - Data user part (DUP)
  - Transaction capability part (TCAP): Allows non-circuit related request-response communication between two nodes in a signaling network.
  - ISDN User part (ISUP): Defines functions, procedures, and signaling information flows to set up, supervise, and release connections.
- Broadband ISUP (and ISUP) define NNI signaling messages (similar to Q.931 and Q.2931)

BISUP Connection Setup

Carrier A Switch — Carrier B Switch

Setup

IAM

Setup

Call Proceeding

IAA

Call Proceeding

Connect   Accept

ANM

Connect

Connect Ack

Release

Connect Ack   Reject

REL

Release

Release Complete

BISUP Messages: Examples

❏ Initial address message IAM

❏ IAM Ack IAA

❏ IAM Reject IAR

❏ Exit message EXM

❏ Answer ANM

❏ Release REL

❏ Release complete RLC

❏ Call progress message CPG

BISUP Message Format

Routing Label
Message Type Code
Message Compatibility
Message Length
Message Content

❑ Routing Label: Same label on all messages relating to a VC

❑ Message type: IAM, ...

❑ Message compatibility information:
What to do if message not understood?
Pass on, Discard message, Release call

❑ Message length: length of content

BISUP Parameter Format

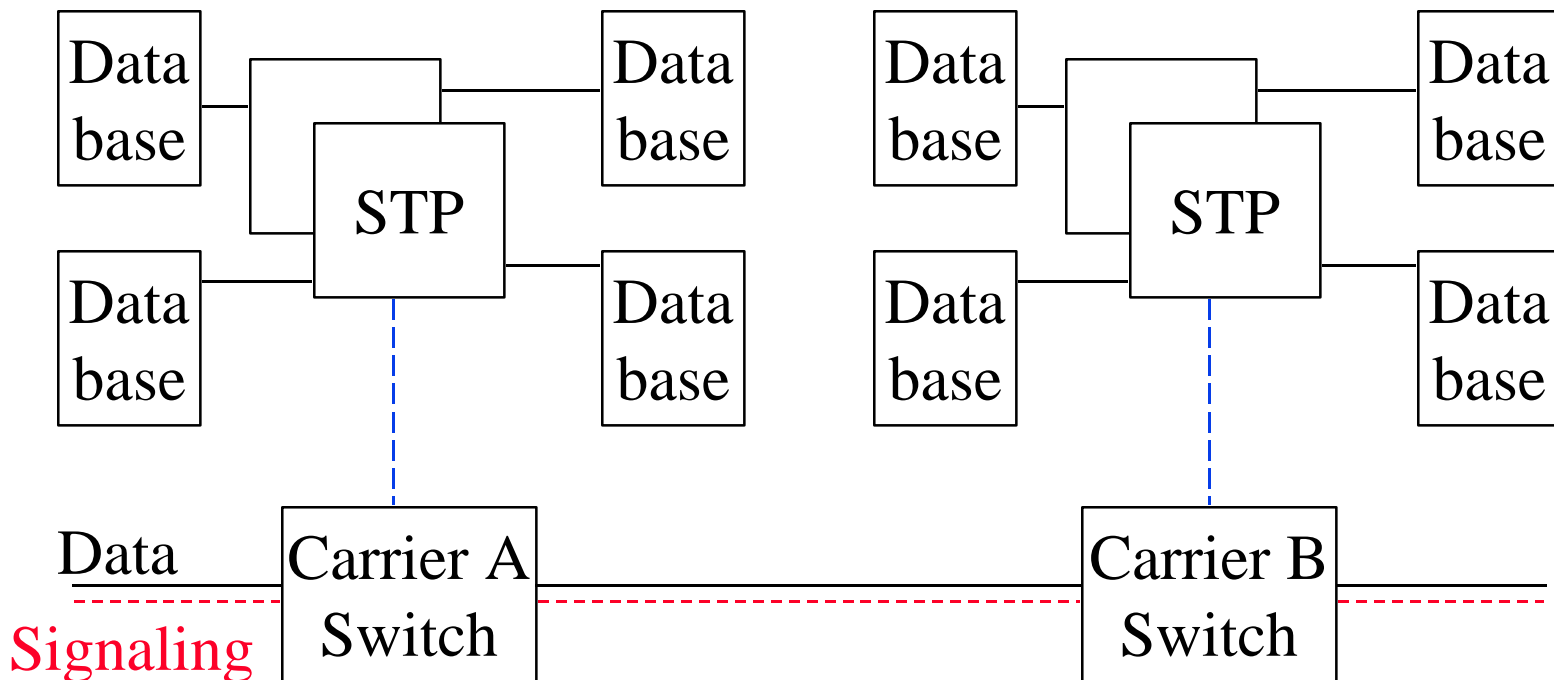| Parameter name |
| --- |
| Length Indicator |
| Parameter compatibility |
| Parameter Content |

❑ Parameter compatibility information:
What to do if parameter not understood?
Pass on, discard parameter, discard message, release call

BISUP Parameters: Examples

- Called party number
- Called party subaddress
  carries ATM End System Address (AESA)
- Calling party number
- Calling party subaddress
- AAL parameters
- Additional calling party number
- ATM user traffic descriptor
- Broadband bearer capability
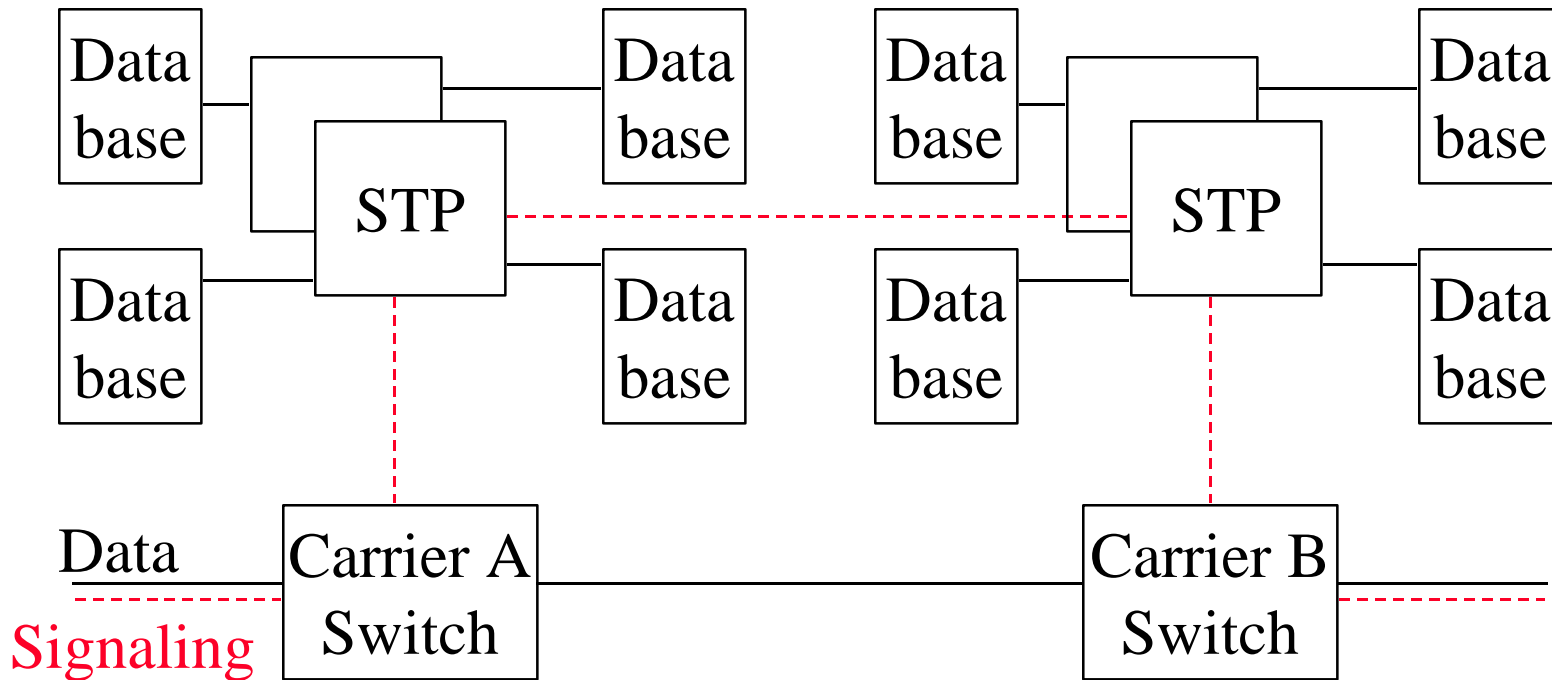- Maximum end-to-end transit delay
- Transit network selection

Associated Signaling

❑ B-ICI uses a subset of BISUP messages and information elements and uses them for inter-carrier NNI.
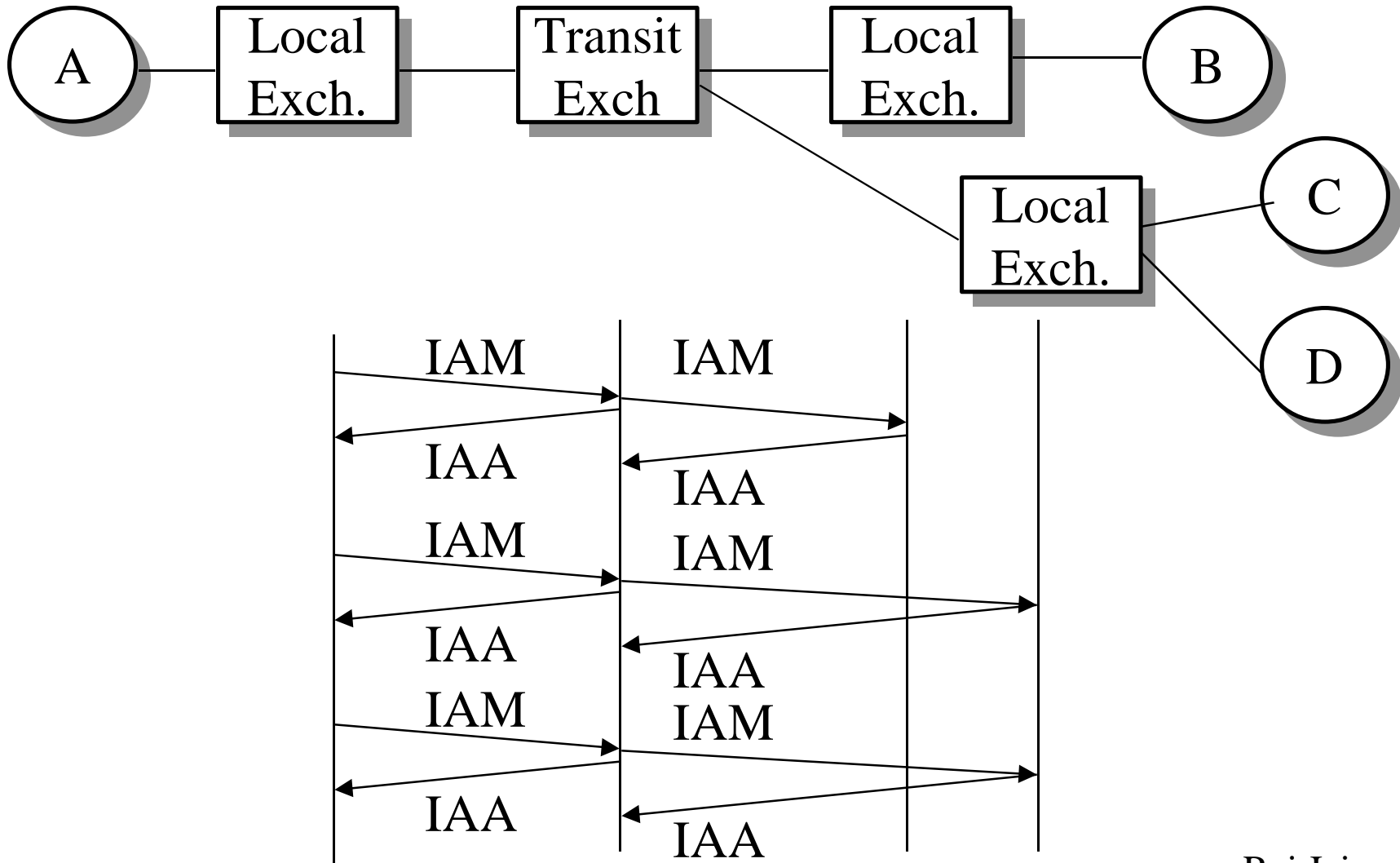
❑ B-ICI supporst only associated signaling

Quasi-Associated Signaling

❑ BISUP supports quasi-associated signaling also.
   But B-ICI does not.

Data base			Data base		Data base			Data base
	STP					STP		
Data base			Data base		Data base			Data base

Data ————— Carrier A Switch ————————— Carrier B Switch —————

Signaling

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Multipoint Call

A —— Local Exch. —— Transit Exch —— Local Exch. —— B

Transit Exch —— Local Exch. —— C

Local Exch. —— D

IAM   IAM

IAA
        IAA
IAM   IAM

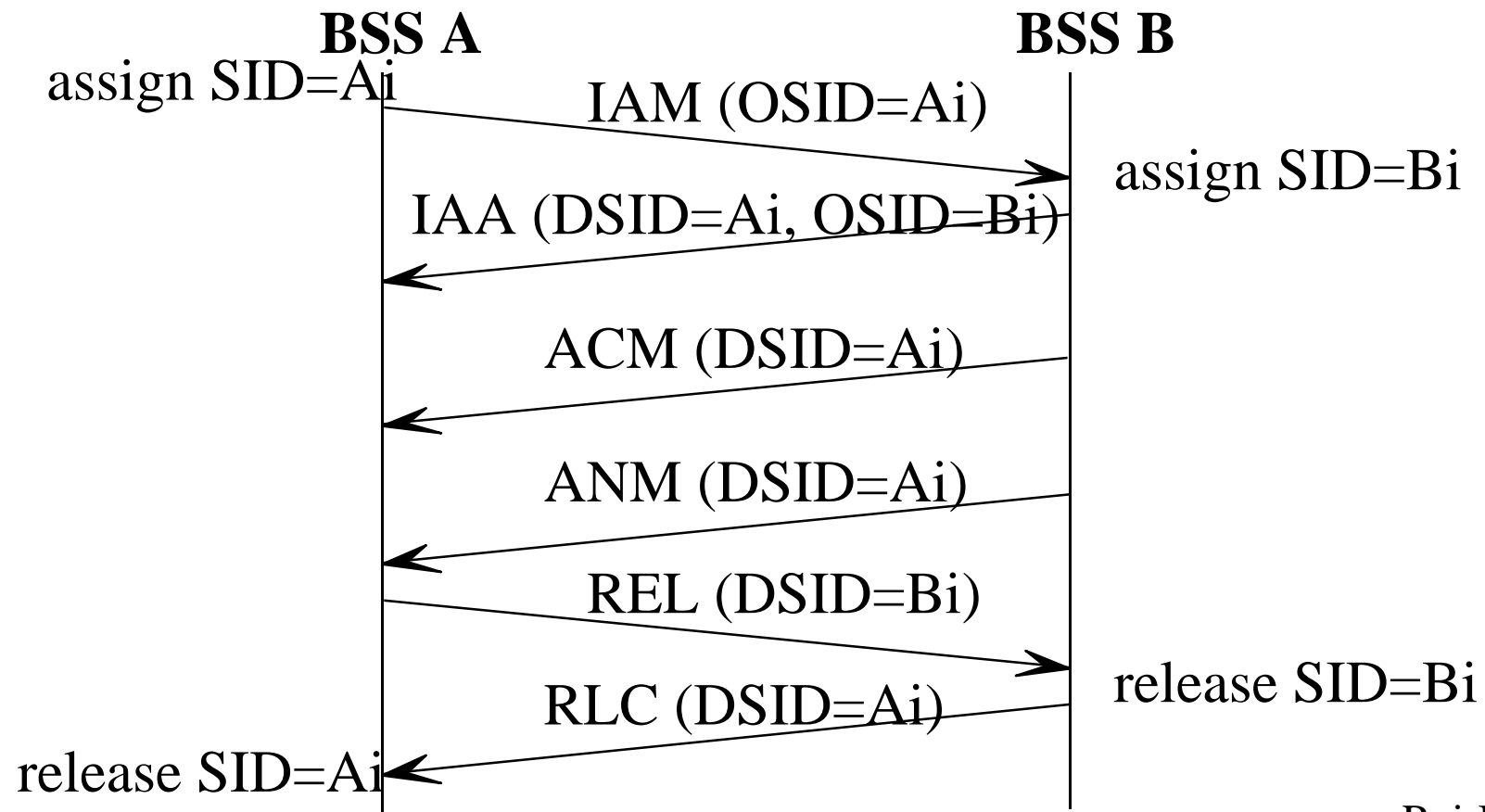IAA
        IAA
IAM   IAM

IAA
        IAA

Multipoint Call (Cont)
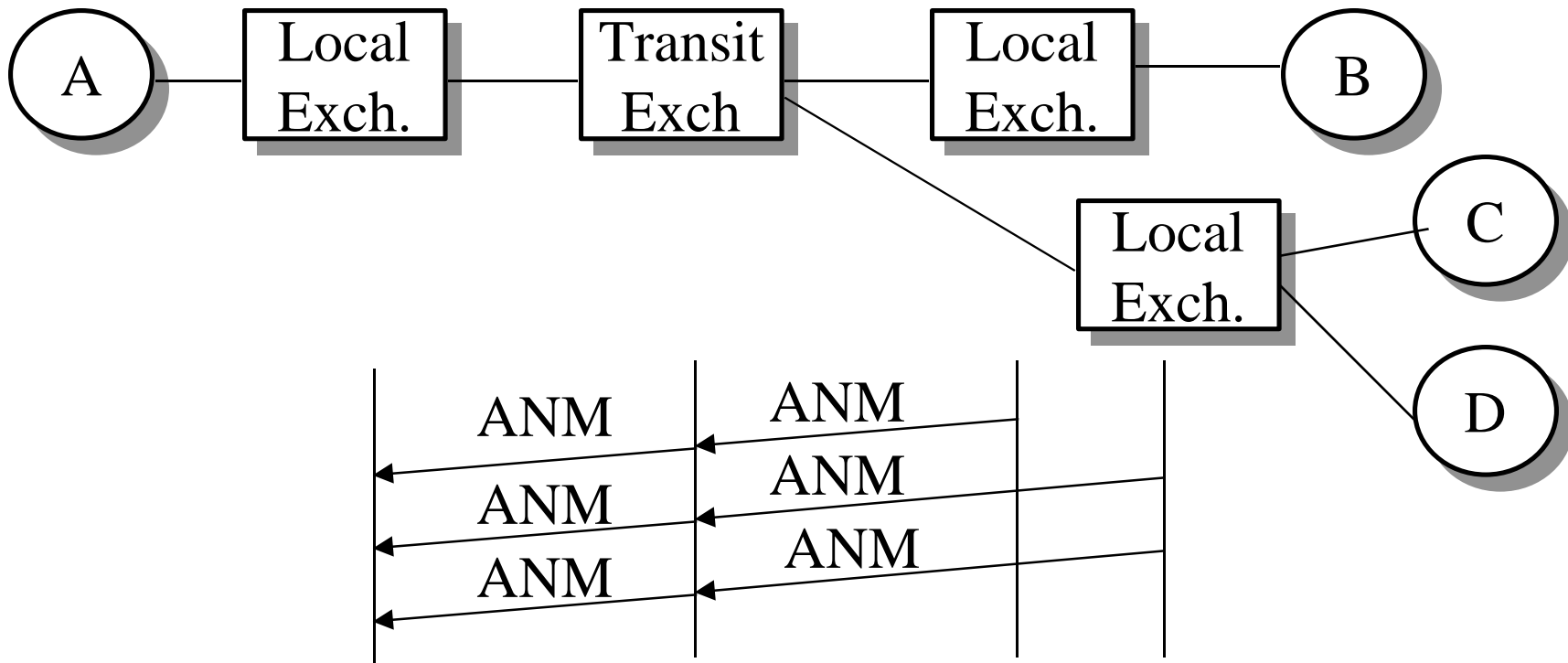
- Leaf party type parameter
  = 0 ⇒ First end point
  = 1 ⇒ 2nd and subsequent end points

Signaling Identifiers (SIDs)

❏ Identify a signaling association between two switches

❏ Each switch gives its own ID

BSS A   **BSS B**

assign SID=Ai

IAM (OSID=Ai)

assign SID=Bi

IAA (DSID=Ai, OSID=Bi)

ACM (DSID=Ai)

ANM (DSID=Ai)

REL (DSID=Bi)

release SID=Bi

RLC (DSID=Ai)

release SID=Ai

BISUP Maintenance Control Fns

❑ **Reset**: Caused by unexpected messages.

❑ **Blocking**: Enter diagnostic mode.

❑ **Remote User Part Availability**: Not supported by B-ICI.

❑ **Transmission Alarm**: fault indication.

❑ **Automatic Congestion Control**: Switch is overloaded. No new connections. or Release current connection"

❑ **Signaling Congestion Control**: Signaling network is overloaded. Discard lower priority messages. Four priority levels.

❑ **Destination Unavialability**: No new connections. Current connections released after a timeout.

❑ **VPCI/VPI consistency check**: Loopback test

Maintenance Control Messages

❑ Blocking BLO

❑ Blocking Ack BLA

❑ Unblocking UBL

❑ Unblocking Ack UBA

❑ Reset RSM

❑ Reset Ack RAM

❑ User Part Test UPT

❑ User Part Available UPA

❑ Consistency Check Request CCR

❑ Consistency Check Request Ack CCRA

❑ Consistency Check End CCE
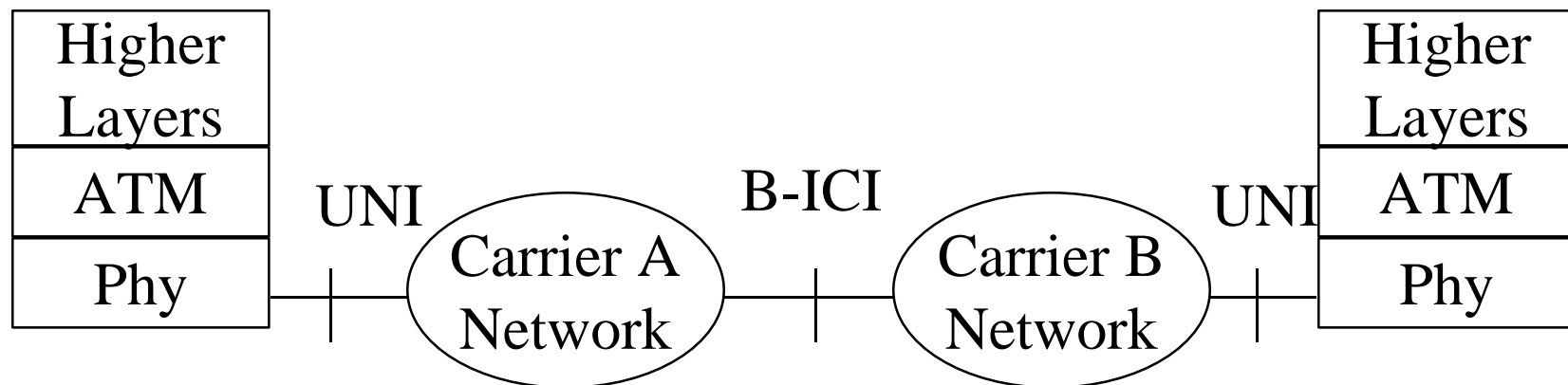
❑ Consistency Check End Ack CCEA

Protocol Monitoring

❑ Keep count of

    ❑ Calls released due to:

        ✦ Urecognized messages

        ✦ Unrecognized parameters

    ❑ BISUP messages discarded

    ❑ BISUP parameters discarded

Usage Measurement

- ❑ Ingress total cells
- ❑ Ingress high priority cells
- ❑ Egress total cells
- ❑ Egress high priority cells
- ❑ Interval start date
- ❑ Interval state time
- ❑ Interval elapsed time
- ❑ Recording interface: UNI or PVC
- ❑ Recording connection identifier
- ❑ Carrier identifier
- ❑ Type of service

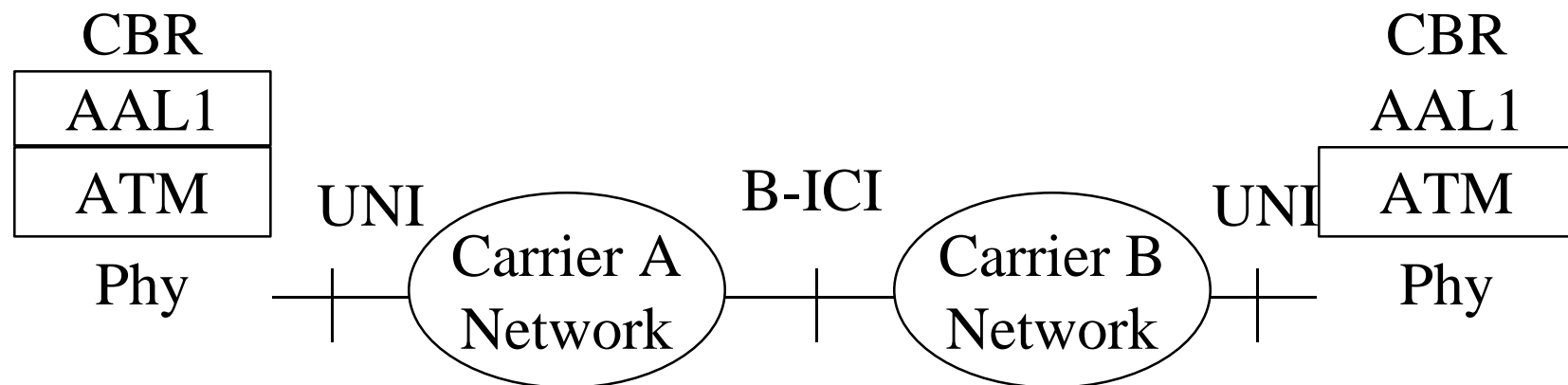# Cell Relay Service

❑ Provides multiple QoS: CTD, CDV, CLR, Cell error ratio, Cell misinsertion rate, Mean time beween service outages, mean time to restore
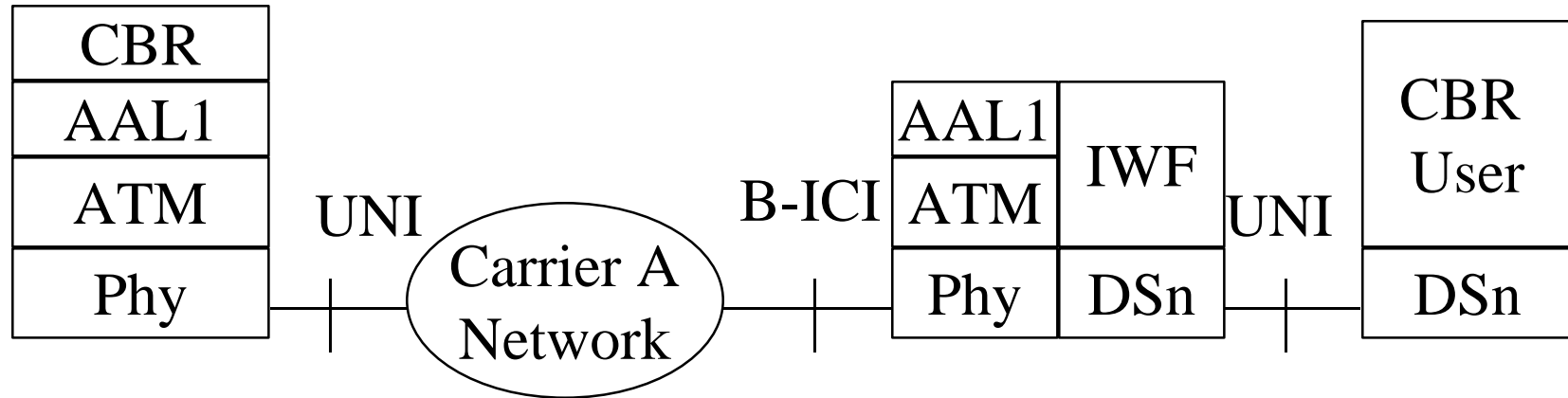
❑ Static routing

❑ Operation and maintenance

Higher Layers
ATM
Phy

UNI

Carrier A Network

B-ICI

Carrier B Network

UNI

Higher Layers
ATM
Phy

Circuit Emulation Service

❏ AAL1 for DS-1 and DS-3

❏ ATM to ATM

```
CBR                                                    CBR
┌──────────┐                                      ┌──────────┐
│  AAL1    │                                      │  AAL1    │
├──────────┤     UNI              B-ICI      UNI  ├──────────┤
│  ATM     │      ┌─────────┐      ┌─────────┐    │  ATM     │
└──────────┘      │Carrier A│      │Carrier B│    └──────────┘
  Phy      ───┼──│Network  │──┼──│Network  │──┼──   Phy
                  └─────────┘      └─────────┘
```

CES Interworking

❏ ATM to DSn

```
┌─────────┐                                    ┌──────────┬──────┐      ┌──────────┐
│   CBR   │                                    │  AAL1    │      │      │   CBR    │
├─────────┤                                    ├──────────┤ IWF  │      │   User   │
│  AAL1   │                                    │  ATM     │      │      │          │
├─────────┤   UNI        ╭──────────╮   B-ICI  ├──────────┼──────┤ UNI  ├──────────┤
│  ATM    │              │ Carrier A │          │  Phy     │ DSn  │      │   DSn    │
├─────────┤              │  Network  │          │          │      │      │          │
│  Phy    │              ╰──────────╯          └──────────┴──────┘      └──────────┘
└─────────┘
```

❏ DSn to DSn

```
┌─────────┐          ┌──────┬──────────┐          ┌──────────┬──────┐      ┌──────────┐
│   CBR   │          │      │  AAL1    │          │  AAL1    │      │      │   CBR    │
│   User  │   DSn    │ IWF  ├──────────┤  B-ICI   ├──────────┤ IWF  │ UNI  │   User   │
├─────────┤          │      │  ATM     │          │  ATM     │      │      ├──────────┤
│   DSn   │          │ DSn  │  Phy     │          │  Phy     │ DSn  │      │   DSn    │
└─────────┘          └──────┴──────────┘          └──────────┴──────┘      └──────────┘
```
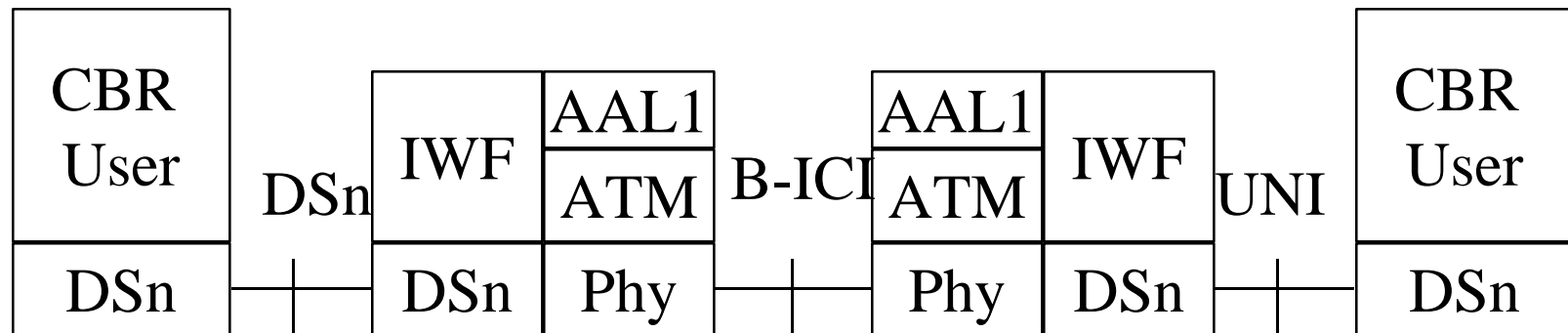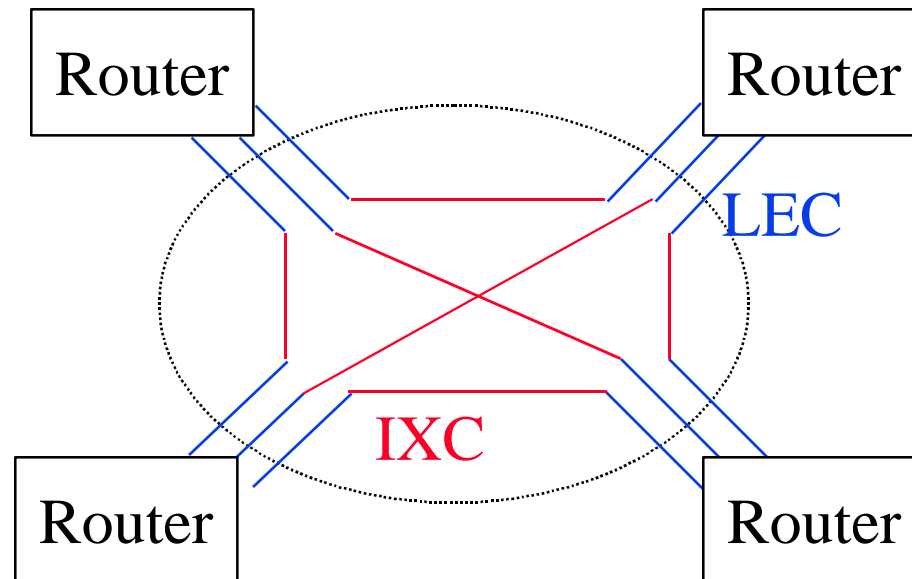
Problems with Leased Lines

❏ No user-to-user end-to-end signaling

❏ Multiple logical links ⟹ Multiple connections

❏ Four nodes ⟹ 12 ports, 12 local exchange carrier (LEC) access lines, 6 inter-exchange carrier (IXC) connections

❏ One more node ⟹ 8 more ports, 8 more LEC lines, 4 more IXC circuits

Solution: Frame Relay

❏ Four nodes: 4 ports, 4 LEC access lines, 6 IXC circuits

❏ One more node: 1 more port, 1 more access line, 4 more IXC circuits
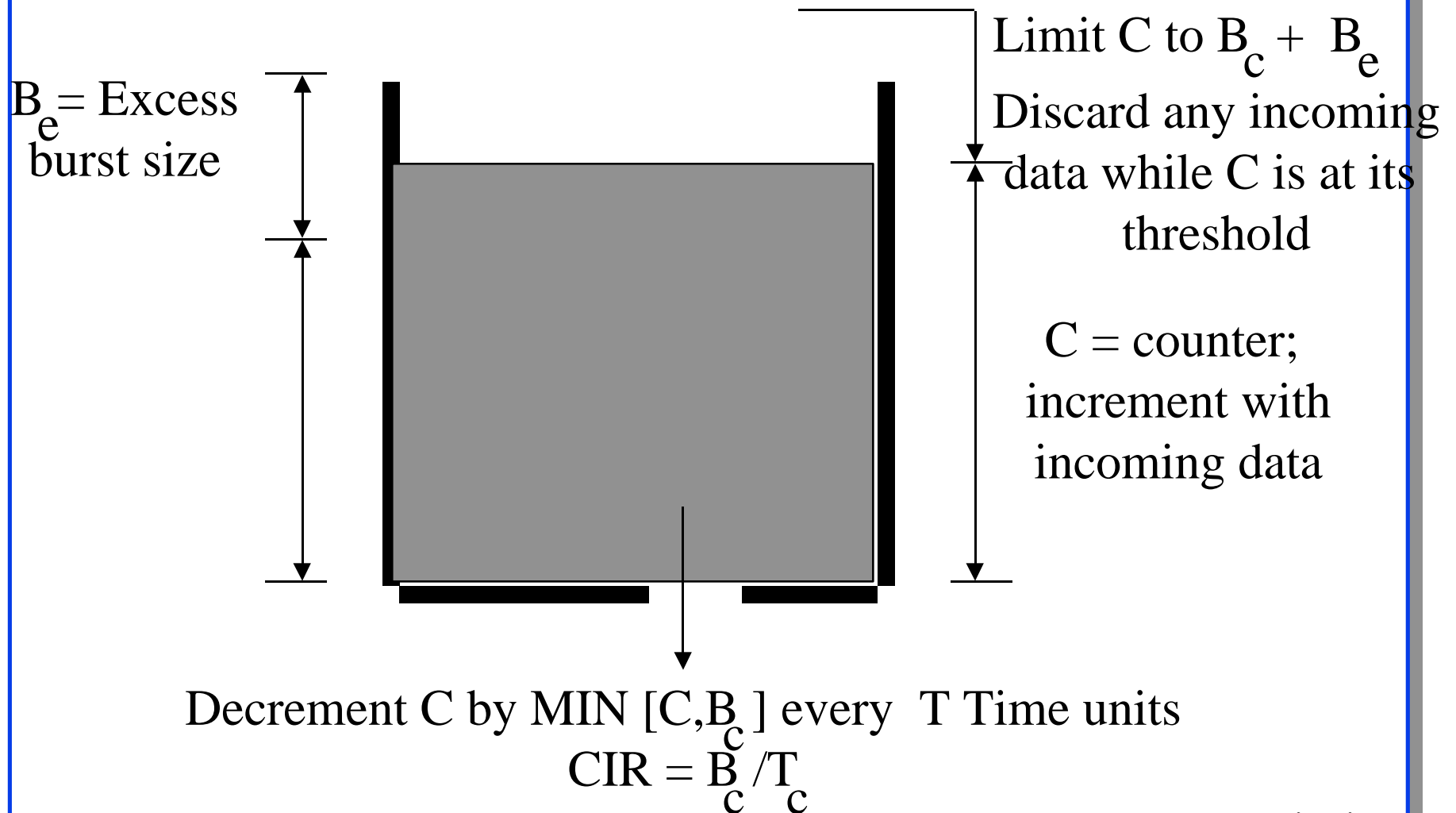
❏ Share leased lines ⇒ Virtual Private Networks
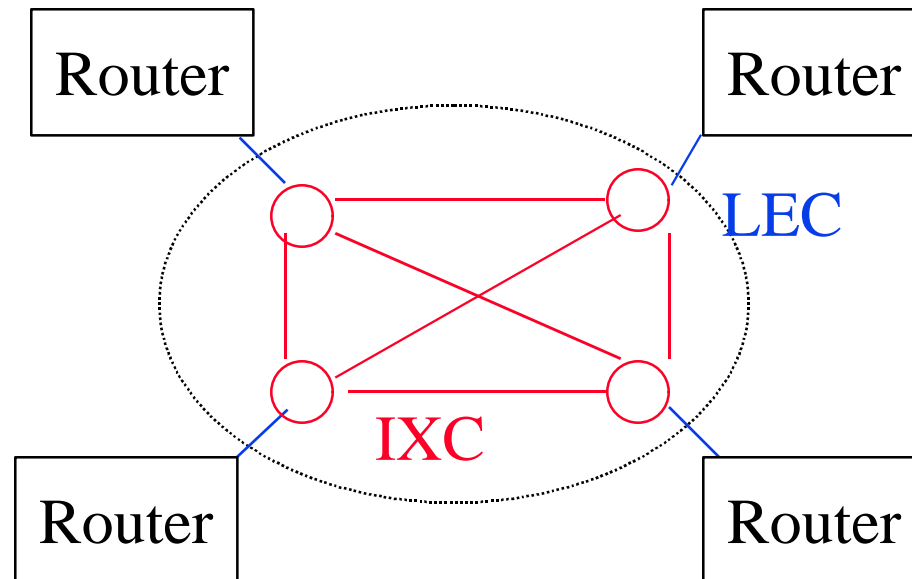
Frame Relay: Key Features

❏ X.25 simplified

❏ No flow and error control

❏ Virtual circuit: Data Link Connection Identifiers (DLCI)

❏ Congestion control added

⇒ Higher speed possible.
   X.25 suitable to 200 kbps. Frame relay to 2.048 Mbps.

Discard Control
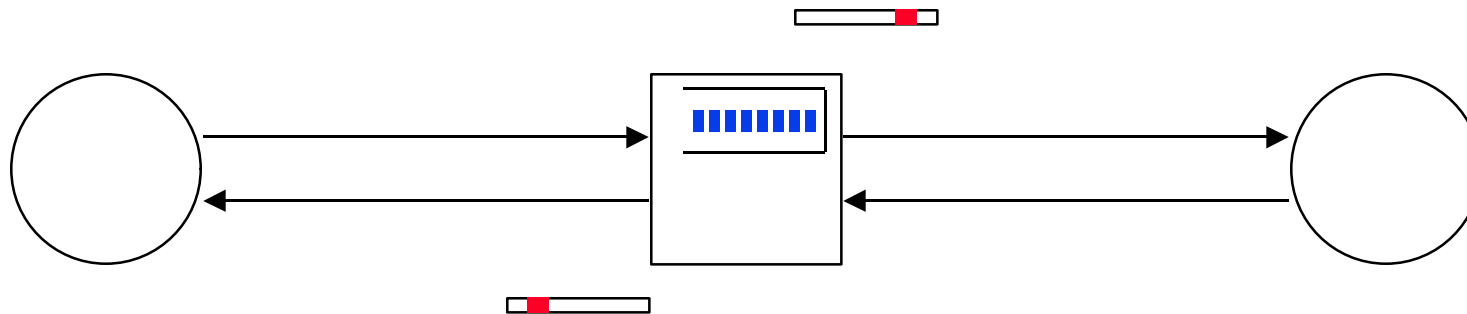
- Committed Information Rate (CIR)
- Committed Burst Size (Bc): Over measurement interval T
  T = Bc/CIR
- Excess Burst Size (Be)
- Between Bc and Be $\Rightarrow$ Mark DE bit
- Over Be $\Rightarrow$ Discard

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Leaky Bucket Algorithm

B_e = Excess burst size

Limit C to B_c + B_e

Discard any incoming data while C is at its threshold

C = counter; increment with incoming data

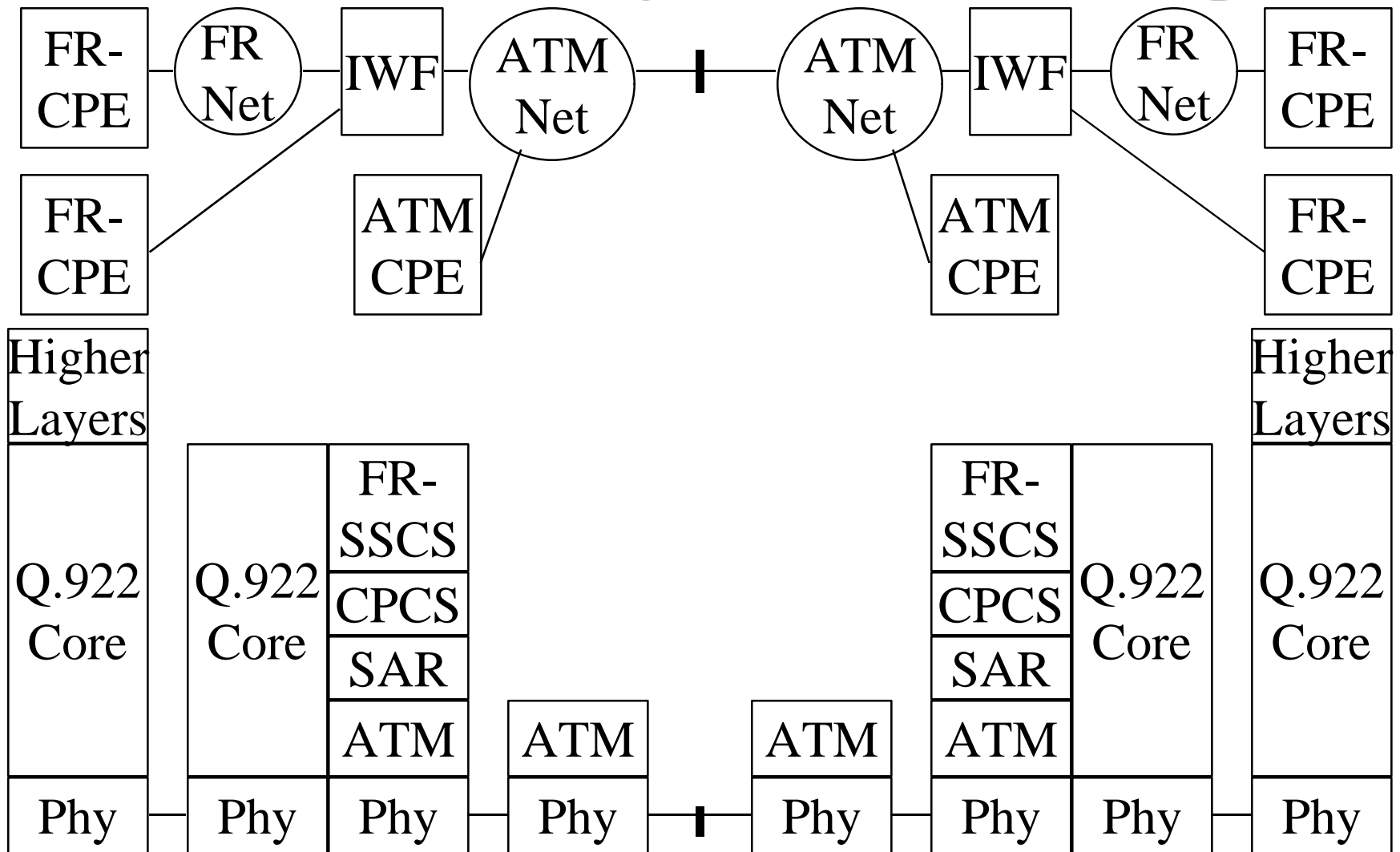Decrement C by MIN [C,B_c] every T Time units

$$CIR = B_c / T_c$$

Congestion Control

❑ Each frame has two bits:

    ❑ FECN: Forward explicit congestion notification

    ❑ BECN: Backward explicit congestion notification

❑ Switches mark the bits when congested

# Frame Relay Interworking

Frame Relay/ATM Interworking

❏ Guidelines for connection parameter translation

    ❏ Formula for converting access line rate, committed information rate, excess information rate, committed burst size, excess burst size, measurement interval to/from PCR, SCR, MBS, CDVT

❏ Guidelines for discard eligibility

    ❏ FR to ATM: Two choices

        ✦ DE = 1 $\Rightarrow$ All cells have CLP=1

        ✦ CLP is not changed. Only header DE.

    ❏ ATM to FR: Two choices

        ✦ Any CLP set $\Rightarrow$ DE =1

        ✦ CLP does not affect DE

FR Interworking (Cont)

❑ Guidelines for forward explicit congestion indication mapping

- ❑ FR to ATM: Copy FECN into header. Set EFCI in cells to 0.

- ❑ ATM to FR: SET FECN if FECN in header or if EFCI of last cell is 1.

❑ Guidelines for Backward congestion indication mapping

- ❑ Pass BECN only in the header.

- ❑ Set BECN in frames going in backward dirction if EFCI in the last cell in the forward direction is 1.

❑ Support FR PVC status management

❑ Usage measurement

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What is SMDS?

❑ Switched: More like dial up then leased lines.
   Usage based billing.

❑ Multi-Megabit: 1.5 Mbps to 45 Mbps

❑ Data: For LAN interconnection

❑ Service: Underlying technology can change.
   Service does not.

❑ Connectionless Broadband Data Service (CBDS) in Europe

```
[   ]   | Bridge or |   ( SMDS )   | Bridge or |   [   ]
        |  Router   |              |  Router   |
```
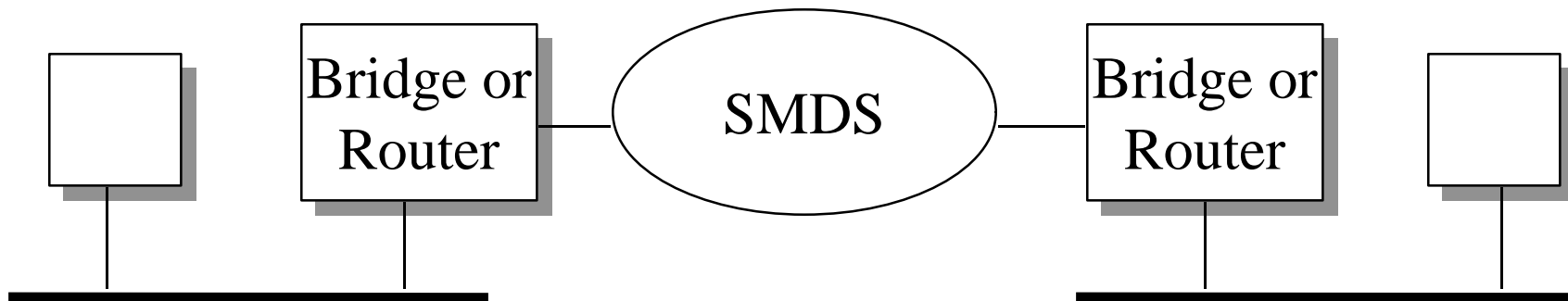
SMDS Objective

- ❑ Designed for LAN Interconnection
  $\Rightarrow$ As many LAN features as possible
- ❑ Multicasting
- ❑ IEEE 802 compatible
- ❑ Connectionless: No connection setup through the network. Each packet carries an address.

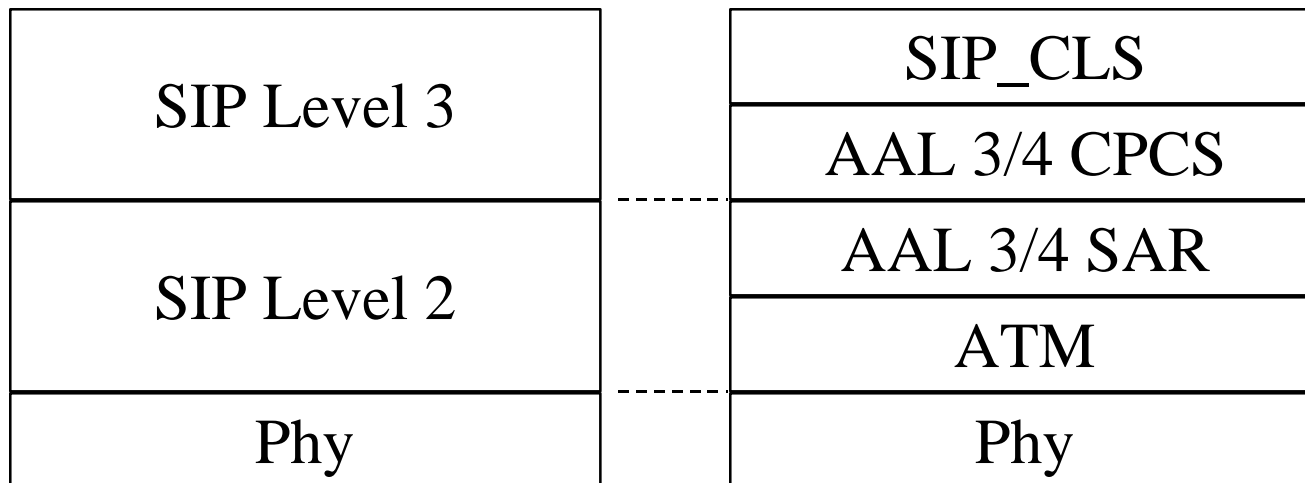| Destination address	Source address	
64 bits	64 bits	

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Routing with SMDS

❑ SMDS network looks like a LAN
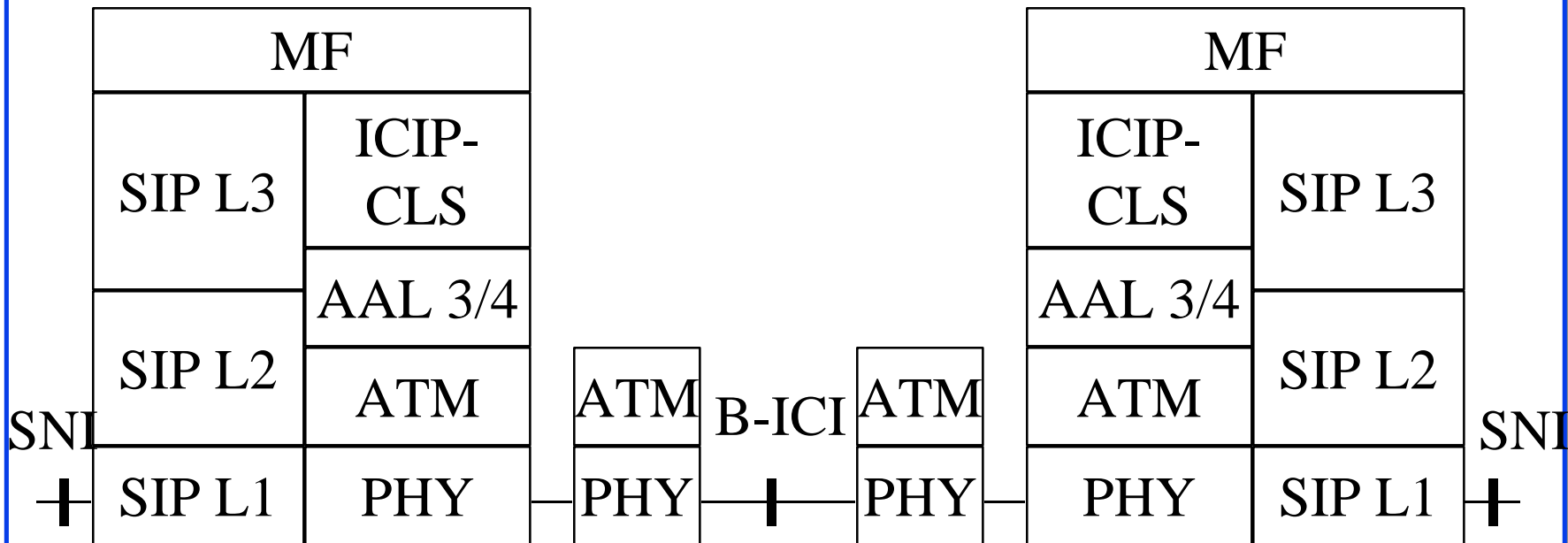
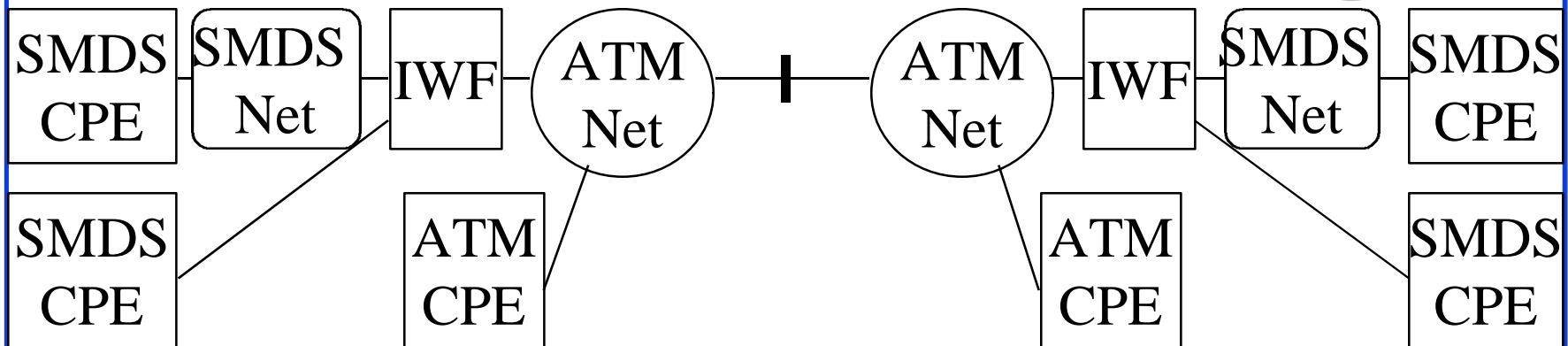❑ RFC 1209 describes IP address to SMDS address translation
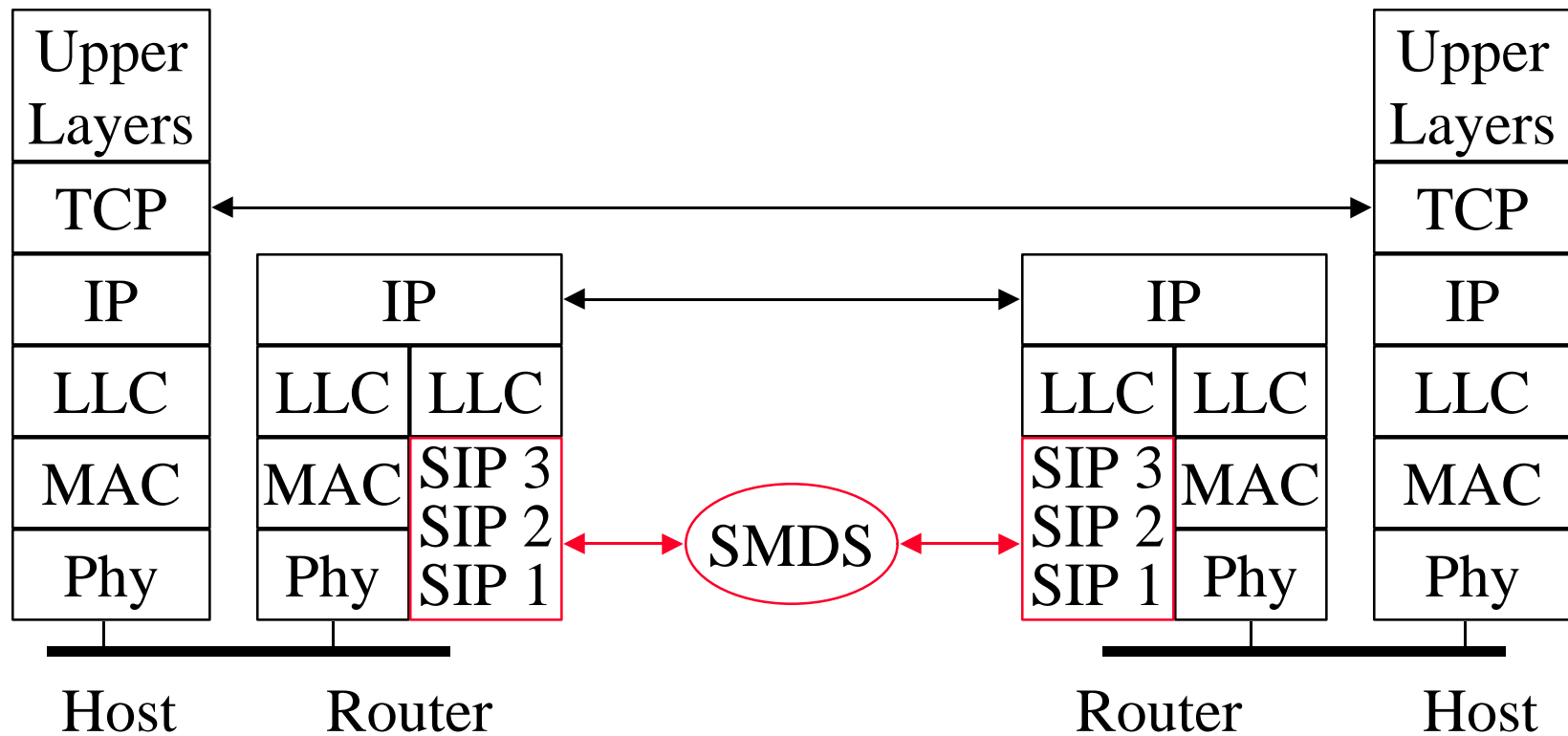
SMDS over ATM
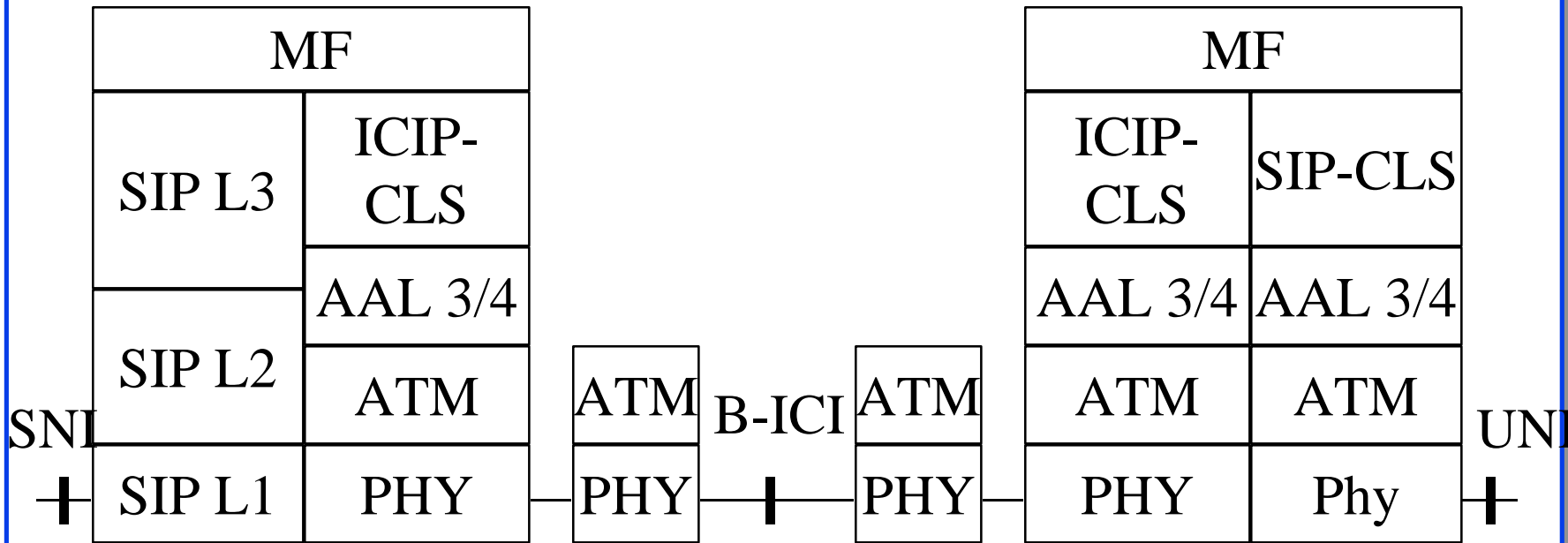
❏ SIP Level 2 uses 53 byte cells

❏ Service Specific Convergence Sublayer (SSCS) = SIP Connectionless Service Layer (SIP_CLS) = Null

❏ AAL 3/4 Common Part Convergence Sublayer

SIP Level 3	SIP_CLS
	AAL 3/4 CPCS
SIP Level 2	AAL 3/4 SAR
	ATM
Phy	Phy

SMDS/ATM Interworking

SMDS CPE	SMDS Net	IWF	ATM Net		ATM Net	IWF	SMDS Net	SMDS CPE

SMDS CPE

ATM CPE

ATM CPE

SMDS CPE

MF							MF	
SIP L3	ICIP-CLS					ICIP-CLS	SIP L3
	AAL 3/4					AAL 3/4	
SIP L2	ATM	ATM	B-ICI	ATM	ATM	SIP L2
SIP L1	PHY	PHY		PHY	PHY	SIP L1

SNI

SNI

SMDS/ATM Interworking (Cont)

SMDS CPE	SMDS Net	IWF	ATM Net	
SMDS CPE		ATM CPE		

ATM Net	IWF	SMDS Net	SMDS CPE
ATM CPE			SMDS CPE

Left stack (MF):

MF	
SIP L3	ICIP-CLS
	AAL 3/4
SIP L2	ATM
SIP L1	PHY

SNI

Middle:

ATM
PHY

B-ICI

ATM
PHY

Right stack (MF):

MF	
ICIP-CLS	SIP-CLS
AAL 3/4	AAL 3/4
ATM	ATM
PHY	Phy

UNI

B-ICI 2.0 vs PNNI 1.0

❑ PNNI 1.0 parameters not specified in B-ICI 2.0:

   ❑ ABR additional parameters

   ❑ ABR setup parameters

   ❑ Alternate ATM traffic descriptor (added for bandwidth negotiation)

   ❑ Minimum acceptable ATM traffic descriptor (for negotiation)

   ❑ Connected number

   ❑ Connected subaddress

   ❑ End-to-end transit delay

   ❑ Extended QoS parameters

- ❏ Generic identifier support
- ❏ Narrowband bearer capability
- ❏ Narrowband high-layer compatibility
- ❏ Narrowband low-layer compatibility
- ❏ Progress indicator

B-ICI vs MTP Level 3

❏ Only a subset of MTP-3 is used in B-ICI

❏ B-ICI does not require any STP functions

❏ B-ICI does not use the following MTP-3 functionality:

  ❏ Differences between national and international

  ❏ N-ISDN interworking

  ❏ Propagation delay determination

  ❏ User part availability procedure

  ❏ Segmentation of messages for use of narrowband signaling links

  ❏ MTP level 3 quasi-associated signaling

  ❏ MTP level 3 restart procedure

B-ICI vs BISUP

❑ B-ICI uses the follwing functions not in B-ISUP:

    ❑ Messages:

        ✦ Exit message

    ❑ Additional parameters:

        ✦ Carrier identification code

        ✦ Charge number

        ✦ Carrier selection information

        ✦ Outgoing facility identifier

        ✦ Originating link information

    ❑ Additional procedures:

        ✦ Transit network selection

Summary

❑ B-ICI uses a subset of BISUP and MTP3

❑ Circuit emulation and ATM services interwork

❑ Frame relay and ATM services interwork

❑ SMDS and ATM services interwork

B-ICI: References

❑ ATM Forum, BISDN Inter Carrier Interface (B-ICI) Version 2.0, May 14, 1996. ftp://ftp.atmforum.com/pub/approved-specs/af-bici-0013.003.doc

BISUP: ITU/ANSI Specs

- Q.2610, BISDN - Usage of Cause and Location in BISDN User Part and DSS2, October 1994.

- Q.2650, Interworking Between the BISDN DSS2 Layer 3 Protocol and the SS7 BISUP, December 1993.

- Q.2722.1, BISDN, BISDN User part - Network Node Interface Specification for Point-to-Multipoint call/Connection Control, July 1995.

- Q.2723, BISDN User Part - Support of Additional Traffic Parameters, July 1995.

- Q.2726.1, BISDN, BISDN User Part - ATM End System Address for Calling and Called Party, July 1995.

- Q.2761, BISDN User Part - Functional Description, October 1994.

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- ❏ Q.2762, BISDN User Part - General Functions of Messages and Signals, October 1994.

- ❏ Q.2763, BISDN User Part - Formats and Codes, October 1994.

- ❏ Q.2764, BISDN User Part - Basic Call Procedures, October 1994.

- ❏ Q.2110, B-ISDN ATM Adaptation Layer Service Specific Connection Oriented Protocol (SSCOP),

- ❏ Q.2140, B-ISDN ATM Adaptation Layer - Service Specific Coordination Function for Signaling at the Network Node Interface (SSCF at NNI).

- ❏ Q.2144, B-ISDN ATM Adaptation Layer - Layer Management for the SAAL at the NNI

- ❏ Q.2210, Message Transfer Part Level 3 Functions and Messages Using the Services of ITU-T Q.2140, May 1995 (TD PL/11-97).

- ❏ T1.648-1995, American National Standard for Telecommunications — Signaling System No. 7 — Broadband ISDN User Part.

SS7 ITU-T Specs

❏ MTP: Q.701-704, Q.706, Q.707, Q.2210 (MTP level 3)

❏ TUP: Q.721-Q.725

❏ ISDN supplementary services: Q.730

❏ DUP: Q.741

❏ ISUP: Q.761-Q.764, Q.766

❏ SCCP: Q.711-Q.714,Q.716

❏ Transactions capability (TCAP): Q.771-Q.775

❏ Operation Maintenance and Administraion part (OMAP): Q.795

❏ Singaling network structure: Q.705

❏ Numbering of International signaling point codes: Q.708

- ❏ Hypothetical signaling reference connection: Q.709
- ❏ PBX application: Q.710
- ❏ Test specifications: Q.780-Q.783
- ❏ Monitoring and Measurement: Q.791

SS7 References: Other

- ❑ ANSI T1.111-1996, American National Standard for Telecommunications — Signaling System No. 7 — Message Transfer Part, 1996.

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- ❑ SMDS Interest Group (SIG)
- ❑ European SMDS Interest Group (ESIG)
- ❑ European Telecommunications Standards Institute (ETSI)
- ❑ Pacific Rim Frame Relay/ATM/SMDS Interest Group (PR FASIG)
- ❑ Internet Engineering Task Force (IETF)
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Acronyms

AAL	ATM Adaptation Layer
ACM	Address Complete Message
AESA	ATM End System Address
Ai	Signaling ID Assigned by Switch A
AIS	Alarm Indication Signal
ANI	Automatic Number Identification
ANM	Answer Message
ANSI	American National Standards Institute
ATM	Asynchronous Transfer Mode
BBC	Broadband Bearer Capability
BCOB	Broadband Connection Oriented Bearer

- BECN Backward Explicit Congestion Notification
- BHLI Broadband High Layer Information
- Bi Signaling ID assigned by Switch B
- B-ICI BISDN Inter Carrier Interface
- BISDN Broadband Integrated Services Digital Network
- BLA Blocking Acknowledgment Message
- BLLI Broadband Low Layer Information
- BLO Blocking Message
- BSS Broadband Switching System
- CAC Connection Admission Control
- CBDS Connectionless Broadband Data Service
- CBR Constant Bit Rate
- CCE Consistency Check End Message

- CCEA   Consistency Check End Acknowledge Message
- CCR   Consistency Check Request Message
- CCRA   Consistency Check Request Acknowledge
- CdPN   Called Party Number
- CDV   Cell Delay Variation
- CES   Circuit Emulation Service
- CFN   Confusion Message
- CgPN   Calling Party Number
- CIP   Carrier Identification Parameter
- CLNS   Connection-Less Network Service

- CLSF   Connection-Less Service Function
- CLP   Cell Loss Priority
- CPCS   Common Part Convergence Sublayer
- CPE   Customer Premises Equipment
- CPG   Call Progress Message
- CRC   Cyclic Redundancy Check
- CRS   Cell Relay Service
- CSI   Carrier Selection Information
- CS-2   Capability Set 2
- CS-2.1   Capability Set 2, Step 1
- DCC   Data Country Code
- DCLI   Destination Connection Link Identifier
- DE   Discard Eligibility

- ❑ DLCI   Data Link Connection Identifier
- ❑ DSID   Destination Signaling Identifier
- ❑ EA   Address Extension
- ❑ EFCI   Explicit Forward Congestion Indication
- ❑ ESIG   European SMDS Interest Group
- ❑ ETSI   European Telecommunications Standards Inst.
- ❑ EXM   Exit Message
- ❑ FEBE   Far End Block Error
- ❑ FECN   Forward Explicit Congestion Notification
- ❑ FERF   Far End Receive Failure
- ❑ FRS   Frame Relay Service
- ❑ HEC   Header Error Control

- ❑ IAA   IAM Acknowledgment Message
- ❑ IAM   Initial Address Message
- ❑ IAR   IAM Reject Message
- ❑ ICD   International Code Designator
- ❑ ICI   Inter Carrier Interface
- ❑ ICIP   Inter Carrier Interface Protocol
- ❑ ICIP_CLS   ICIP Connectionless Service
- ❑ IE   Information Element
- ❑ IEC   Inter Exchange Carrier
- ❑ ILEC   Independent Local Exchange Carrier
- ❑ INC   International Carrier
- ❑ ITU   International Telecommunication Union
- ❑ IWF   Inter-Working Function

- LEC   Local Exchange Carrier
- MF   Mapping Function
- NNI   Network Node Interface
- NPC   Network Parameter Control
- PCR   Peak Cell Rate
- PDH   Pleisiochronous Digital Hierarchy
- PLCP   Physical Layer Convergence Procedure
- OCLI   Origination Connection Link Identifier
- OFI   Outgoing Facility Identifier
- OLI   Originating Line Information
- OSID   Origination Signaling Identifier
- PMD   Physical Medium Dependent
- PVC   Permanent Virtual Connection

- QoS   Quality of Service
- RAM   Reset Acknowledgment Message
- RDI   Remote Defect Indicator
- REL   Release Message
- RLC   Release Complete Message
- RSM   Reset Message
- SAAL   Signaling ATM Adaptation Layer
- SCR   Sustained Cell Rate
- SDH   Synchronous Digital Hierarchy
- SID   Signaling Identifier
- SIG   SMDS Interest Group
- SMDS   Switched Multi-megabit Data Service
- SNI   Subscriber Network Interface

- SONET — Synchronous Optical NETwork
- SPE — Synchronous Payload Envelope
- SSCF — Service Specific Coordination Function
- SSCOP — Service Specific Connection Oriented Protocol
- SSCS — Service Specific Convergence Sublayer
- STS — Synchronous Transport Signal
- SVC — Switched Virtual Connection
- TNS — Transit Network Selection
- UBA — Unblocking Acknowledgment Message
- UBL — Unblocking Message
- UDT — Unstructured Data Transfer
- UNI — User Network Interface
- UPA — User Part Available Message

❑ UPT   User Part Test Message

❑ VBR   Variable Bit Rate

❑ VCC   Virtual Channel Connection

❑ VCI   Virtual Channel Identifier

❑ VPC   Virtual Path Connection

❑ VPCI   Virtual Path Connection Identifier

B-ICI History

❏ V1.1: PVC based approved in Sept'94

❏ V2.0: SVC, multipoint, VBR, NSAP address carriage

❏ V2.1:

❏ V2.1+: ABR

Broadband ISUP (BISUP)

❏ Supports SVC and Switched VPs

❏ CBR and VBR (ABR in future)

❏ Forward and backward PCR (symmetric or assymetric)

❏ AAL 1,2,3/4, 5

❏ Maximum transit delay

❏ Point-to-point and point-to-multipoint

SMDS Features

- Address translation
- Carrier selection
- Source address validation
- Individually addressed packets
- Group addressed packets
- Address screening
- Access classes
- End-user blocking

SMDS Service Types

❏ [Fig 11.1, page 245, BICI]

❏ Exchange SMDS: Local SMDS

❏ Exchange Access SMDS: IEC's customers use LEC's SMDS access service

❏ Inter-Exchange Access SMDS: Long distance SMDS

SMDS Specific Functions

- AAL 3/4
- [fig 11.3, page 251, BICI]
- [Fig 11.6, page 260, BICI]
- [FIg 11.7-10, BICI]

Current Issues in B-ICI

❑ Soft PVC or PVP: Use signaling to setup PVC/PVP

❑ Switched virtual paths: supported in UNI4.0 but not in B-ICI 2.0

❑ Interworking between PNNI and B-ICI: Crankback, DTL

Raj Jain

Quiz

T F   Please check True/False

1. ❏ ❏ Private and Public NNI's are same.

2. ❏ ❏ B-ICI provides automatic topological discovery

3. ❏ ❏ B-ICI is incompatible with SMDS and Frame relay

4. ❏ ❏ B-ICI uses Q.2931 signaling messages

5. ❏ ❏ B-ICI supports associated signaling only.

6. ❏ ❏ B-ICI provides only point-to-point calls

7. ❏ ❏ B-ICI does not provide congestion control

8. ❏ ❏ Frame relay allows connectionless communication.

9. ❏ ❏ SMDS allows connectionless communication

10. ❏ ❏ Frame relay's congestion control interopertes with B-ICI

11. ❏ ❏ SMDS is more compatible with AAL5 than other AALs