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# OSI

AN

## OVERVIEW

PRESENTED TO

GOVERNMENT TELECOMMUNICATIONS AGENCY  
DEPARTMENT OF COMMUNICATIONS

BY

PROTOCOLES STANDARDS DE COMMUNICATION INC.  
1757 RUE BANK  
OTTAWA, ONTARIO  
K1V 7Z4  
(613) 731-7697

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0846  
1987

An OSI Analogy

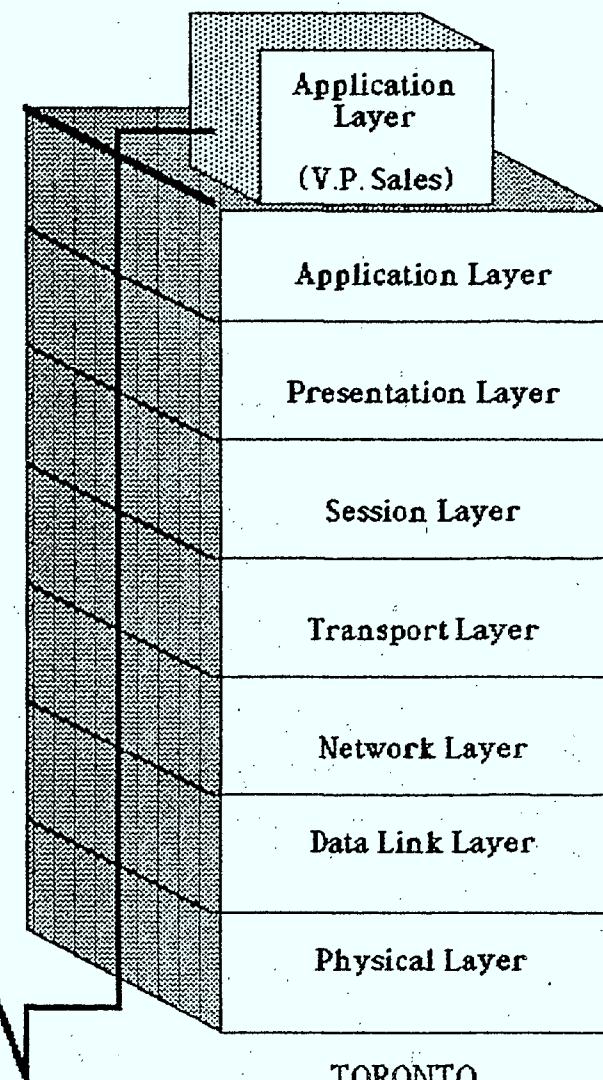
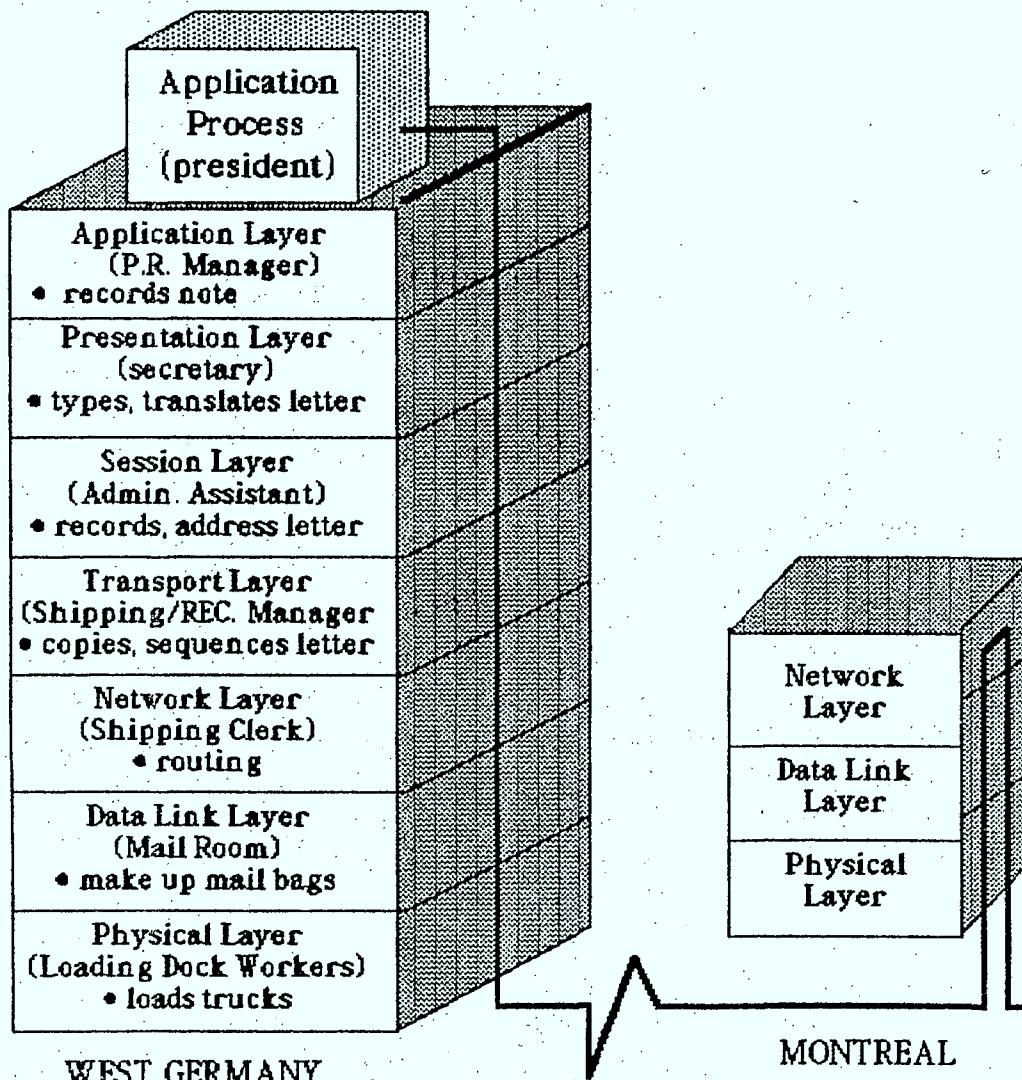
The Business Letter

Protocol Standards de  
Communication Inc.

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\*\*      OSI Analogy      \*\*  
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# The Business Letter



WEST GERMANY

MONTREAL

TORONTO

EX1

## The Business Letter

Imagine that the president of a West German company has agreed to buy one million electronic switches from a firm in Toronto. Because he was given a good price, he asks the public relations manager to send a thank-you note to the sales director of the Toronto firm.

The West German executive represents the application process that initiates a communication. Because he deals in the meaning of the communication, or the semantics only, he merely tells the PR manager to send a thank-you note. The PR manager actually gets the machinery going. He is the Specific Application Service Element of the Application Layer, calling on the services of the layers below him to meet his needs in transmitting the message.

The West German PR manager dictates the note onto a cassette tape and gives it to his secretary, who acts as the Presentation Layer. Accustomed to dealing with Canadian firms in Montreal, she translates the message into French and types it as a formal business letter. In OSI terms, she has prepared the Transfer Syntax - a string of data in a language common to the sender and the receiver - in this case, French.

After typing it, the secretary hands the letter to her administrative assistant - the Session Layer. He records the letter in the German company's file on Canadian Electronics Ltd., ensuring that the right person has been addressed, with the correct title and spelling, exact office number, and other details. This checking allows both ends of the communication to organize and synchronize their dialogue, by noting where the message goes and when it was sent. If there is back-and-forth exchange of information, the Session Layer will manage the dialogue.

The next layer - Transport - is provided by the manager of shipping and receiving. His job is to negotiate the quality of service available from the Network Layer, approve the connection, and provide receipt and delivery. He is really guaranteeing end-to-end transmission. If something untoward happens during transmission, he will recover by sending another copy of the letter - hence he always copies a letter before sending it.

After coping the letter, he assigns a sequence number (in this case, "1 of 1"). Then he passes the shipment - tagged with both destination address and phone sequence number - to a shipping clerk. He tells the clerk to establish a route over which the note will be sent to Toronto. The Net-

work Layer (the shipping clerk) will select the routing and advise the Transport Layer (the transport manager) of it.

The shipping clerk calls his counterpart in the German company's Montreal office. He learns that the company's internal mail service can take the shipment to the Montreal office, and CP Express will deliver it to Toronto the next day. Note that OSI applies to communications over private networks (the company's internal mail operation) and public networks (CP Express).

He attaches a routing slip and puts the letter with others into a mail cart labeled "Montreal". Then he sends the cart to the mailroom, which serves as the Data Link Layer.

The mailroom workers also make copies of everything they receive, bag the mail, and weigh it on a very accurate scale. They note the destination and weight of each mailbag on a tag attached to the bag. Then they move the bag to the loading dock - the Physical Layer, or the interface to the physical medium (the trucks, trains, and airplanes to take it to Canada).

The workers on the dock call the trucks and load the mailbags onto them when they arrive. At this

point, the "bits" have left the machine and are in transit on the medium - the communication has been sent on its journey.

When the mailbag arrives in Montreal, the workers on the Montreal loading dock - the Physical Layer - pass the mailbag to the workers in their mailroom - the Data Link Layer. This mail room has a scale identical to the one in West Germany, which can detect the loss of even one letter from the mailbag. If the weight of the bag does not match that on the label, the whole shipment is rejected and the mailroom in Germany is notified to send replacement copies of all the letters, using the duplicates they have kept.

This task represents the "frame check sequences" performed by the Data Link Layer. In this case, the weight of the letters matches exactly, so the Montreal mailroom sends word back to Germany that the mailbag is OK. Then the shipment goes to the routing clerk in Montreal - the Network Layer - who opens the mailbag and sorts the mail.

Mail for employees in the Montreal office gets passed along to the transport manager - the Transport Layer - for processing up in the organization. Other mail remains at the Network Layer to be rerouted. The routing clerk recognizes

the thank-you letter as one to be sent through CP Express, so she tags it and sends it back to the mailroom.

The mailroom groups together (multiplexes) all mail for delivery by CP Express, as there are many letters concerning the electronics deal. Again the contents are copied, weighed, sealed (in a CP Express package), and tagged with a new shipment number and address. The bags go out onto the loading dock and away in the CP Express trucks.

Assuming CP Express and the Toronto firm use an OSI model, they will go through a similar process to route the package. In all cases, only the lower three layers - Network, Data Link, and Physical - are involved when a message is routed via intermediate networks. The upper layers - Transport and above - are involved only at the origination and destination of a communication.

When the CP Express package arrives in Toronto, the routing clerk passes it up to the transport manager, who checks the packing slip and telephones her counterpart in Germany to let him know that the letter has arrived in good order.

In this way the Transport Layer acknowledges "end to end" communications. All

previous acknowledgements have been at the Data Link Layer, from one leg of a journey back to the previous leg. This final acknowledgement connects the end of the journey to the beginning, no matter what carriers - reliable or not - have been used in between.

Once the communication has been received and acknowledged by the Transport Layer, it is passed along to the Session Layer. A file clerk logs the letter in the file for the German buyer and takes the letter to the Presentation Layer - the sales manager's secretary. She reads the letter, determines that it is in French and translates it into English.

The secretary gives the translated letter to the sales manager of Canadian Electronics, who serves as the Application Layer. At a staff meeting, the sales manager informs the VP of sales that the German firm has thanked him for the good price. The receiving application process - the VP of Sales - receives the semantics of the message, but not the message itself, which was "Danke Schon".

(Adapted from IEEE Spectrum, March 1986)

## OPEN SYSTEMS INTERCONNECTION

## INTERCONNEXION DES SYSTÈMES OUVERTS

(OSI)

P A R T  1	OPENING REMARKS  OVERVIEW OF GOVERNMENT INFORMATION/ COMMUNICATIONS SYSTEMS INTERWORKING  • Environment • Approaches.	09:00 - 09:20  09:10 - 09:20 Dan Sum, GTA/ATG	OUVERTURE DE LA SESSION  VUE D'ENSEMBLE DE L'INTER- FONCTIONNEMENT DES SYSTÈMES D'INFORMATION ET DE COMMUNICA- TION AU GOUVERNEMENT  • Environnement • Méthodes	P A R T  1
INTRODUCTION TO OSI THE PROBLEM THE SOLUTION OSI ARCHITECTURE	09:20 - 10:15 Steve Zeber, PSC Inc.	INTRODUCTION A L'OSI LE PROBLÈME LA SOLUTION ARCHITECTURE DE L'OSI		
IMPACT ON DECISION-MAKING IN THE GOVERNMENT	10:15 - 10:30 Ed Acheson, TBS/CT	IMPACT SUR LA PRISE DE DÉCISION AU GOUVERNEMENT		

— Coffee —

10:30 - 10:45

— Pause-café —

P A  R  T	OSI LAYERS APPLICATION SERVICES	10:45 - 12:00 Steve Zeber, PSC Inc.	COUCHES DE L'OSI APPLICATIONS	P A  R  T
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— Lunch —

12:00 - 13:00

— Déjeuner —

P A  R  T  2	OSI PROMISE CANADIAN SUPPORT TO OSI MIGRATING TO OSI STANDARDS  FOLLOW-ON TRAINING TOPICS - File transfer access and management - Message handling systems  - OSI management - Security in open systems  - Systems Network Architecture (SNA) and OSI - Teletex - Office Document Architecture and OD interchange format - PCs and OSI - Virtual terminal service - Communication modes	13:00 - 14:00 Gaston Dallaire, DOC Steve Zeber, PSC Inc.  14:00 - 14:30 Steve Zeber, PSC Inc.	AVANTAGES DE L'OSI APPUI DU CANADA A OSI CONVERSION AUX NORMES DE L'OSI  AUTRES SUJETS DE FORMATION - Transfert de fichiers (accès et gestion) - Systèmes de traitement des messages - Gestion de l'OSI - Sécurité dans les systèmes ouverts - Architecture de réseau des systèmes et l'OSI - Teletex - Architecture ODA et format ODIF - Les PC et l'OSI - Service sur terminal virtuel - Modes de communication	P A  R  T  2
	COMMON SERVICE APPROACH FOR GOVERNMENT INFORMATION SYSTEMS INTERWORKING	14:30 - 15:00 Victor Grebler, GTA	PRINCIPE DES SERVICES COMMUNS APPLIQUÉ A L'INTER- FONCTIONNEMENT DES SYSTÈMES D'INFORMATION DU GOUVERNEMENT	

— Coffee —

— Pause-café —

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# OVERVIEW

Industry Canada  
Library Queen

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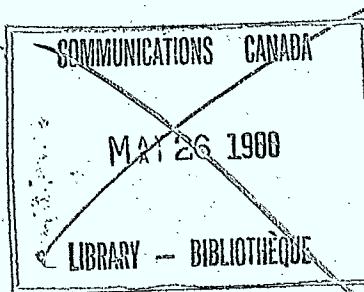
Industrie Canada  
Bibliothèque Queen

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\*\*      Introduction  
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# OSI - An Overview

## OBJECTIVES

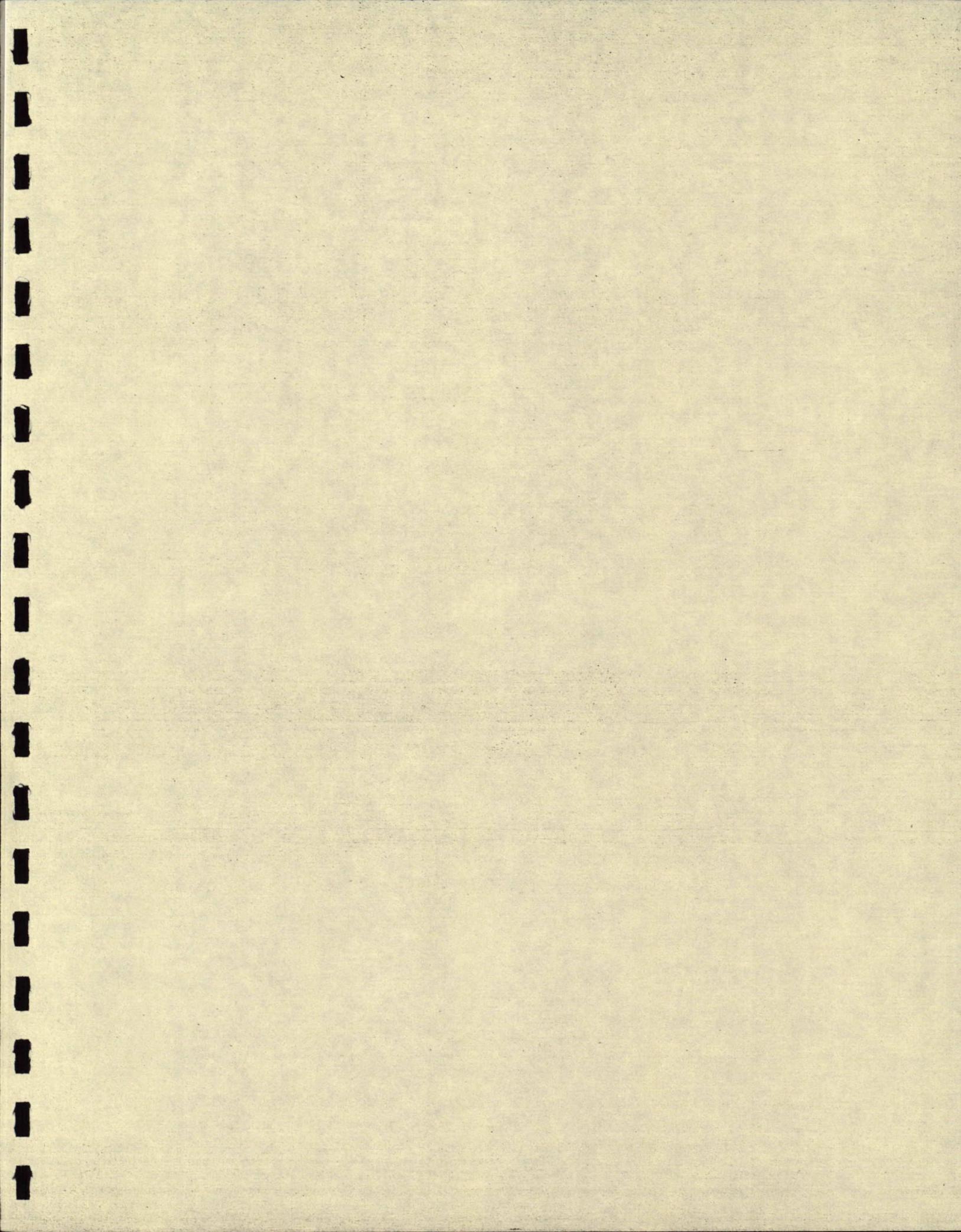
- Why OSI is important
- Introduce OSI concepts
- Describe OSI layer functions, standards
- Identify current support and future directions
- Propose a Migration Strategy

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\*\*      Introduction      \*\*  
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## TOPICS (A.M.)

1. The Problem
2. The Solution
3. OSI Architecture
4. Functions of the OSI Layers
5. The OSI Promise
6. An OSI Migration Strategy



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\*\*      The Problem  
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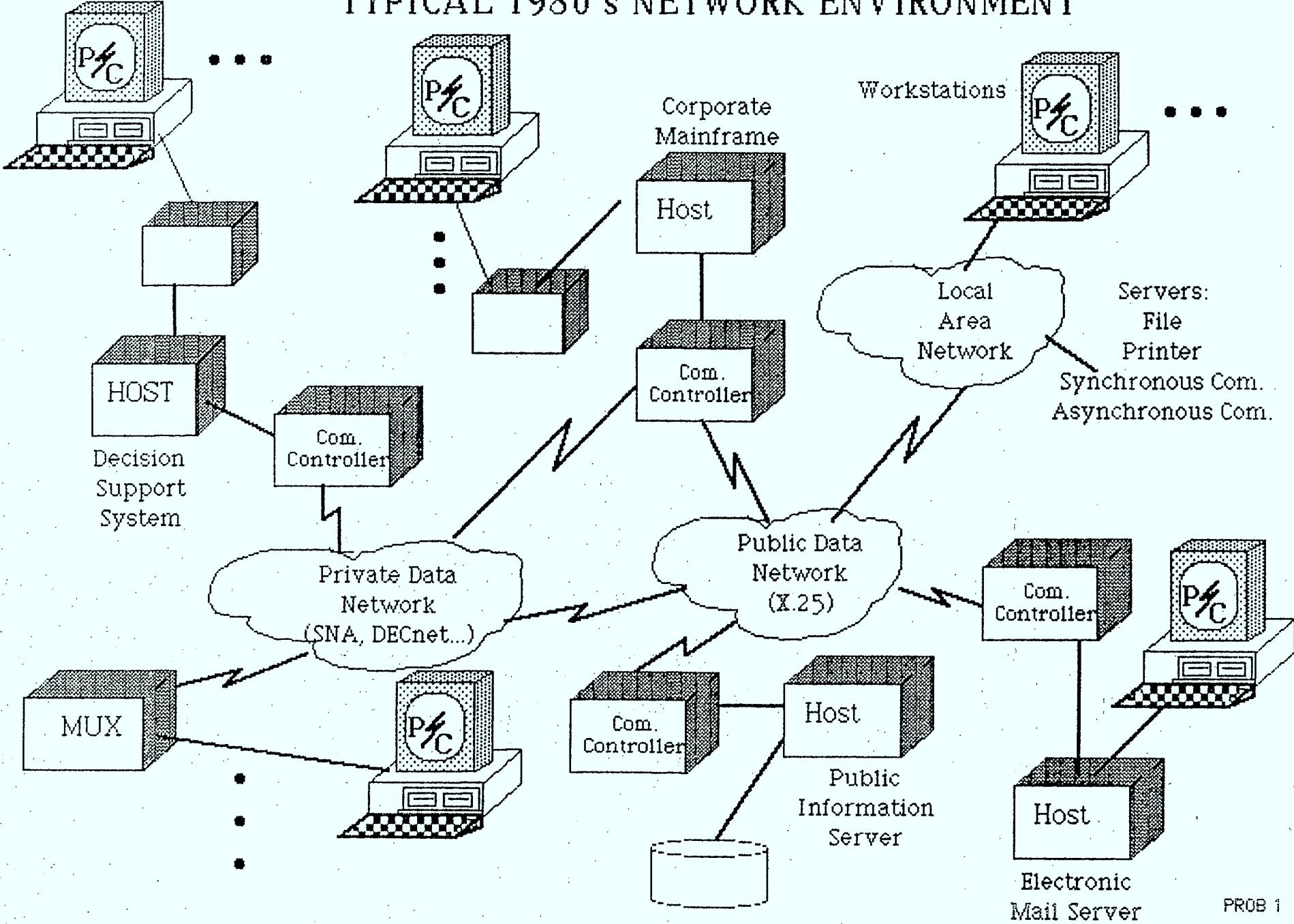
# THE PROBLEM of DISTRIBUTED PROCESSING

PROB 0

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\*\* The Problem  
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## TYPICAL 1980's NETWORK ENVIRONMENT



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\*\*      The Problem      \*\*  
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## Distributed Processing Requirements

- local and global data transfer
- cooperating processes
- common language
- global resource management

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\*\*      The Problem  
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## Typical Network

- different manufacturers equipment
- different transmission technologies
- different communication protocols
- different data representations

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\*\*      The Problem      \*\*  
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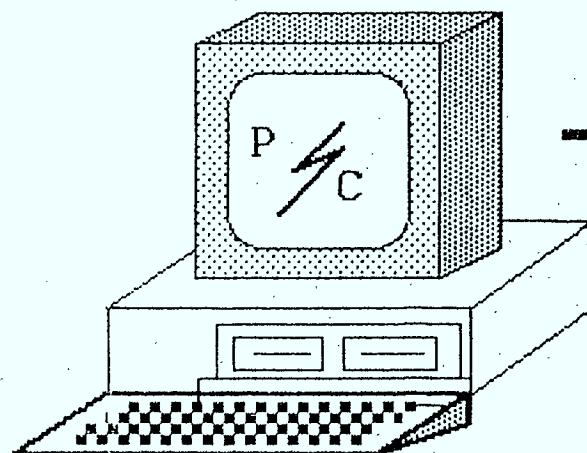
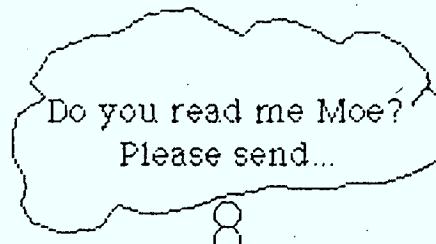
## Common Incompatibilities

- file formats (IBM, DEC, ...)
- document structures (IBM PC, MacIntosh)
- electronic mail functionality (Envoy 100, Telenet, ...)
- business transaction formats (Transportation, Food, Drug)
- CAD/CAM systems (Allen-Bradley, Gould, ...)

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\*\*      The Problem  
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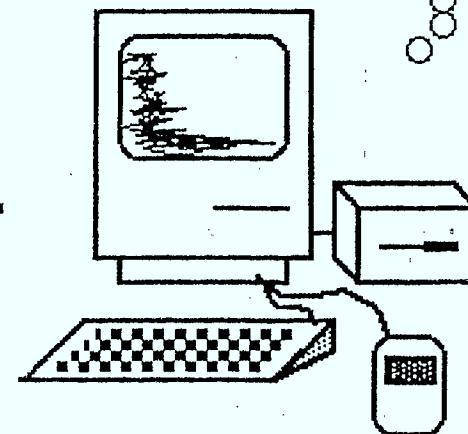
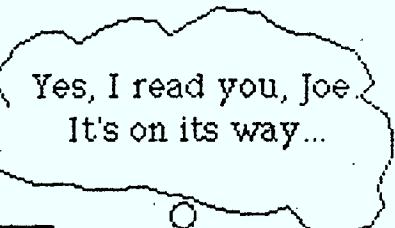
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Application  
Process  
Joe



## WHAT WE NEED

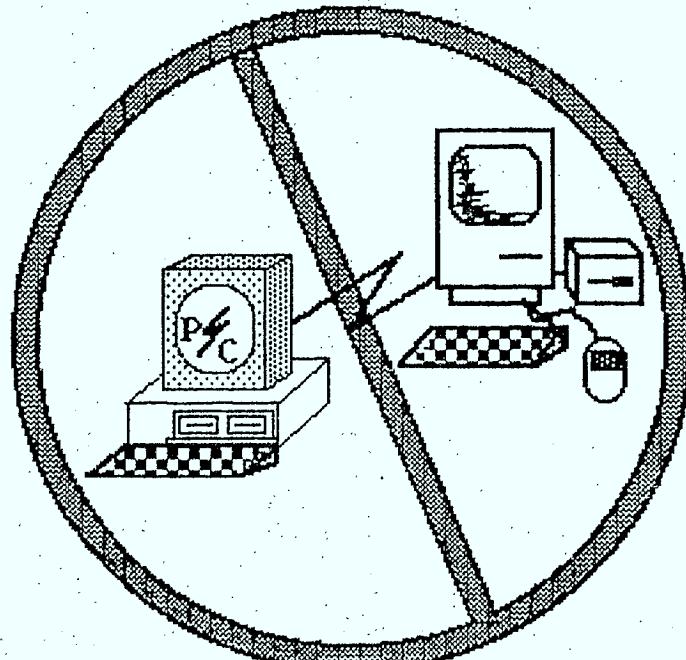
Application  
Process  
Moe



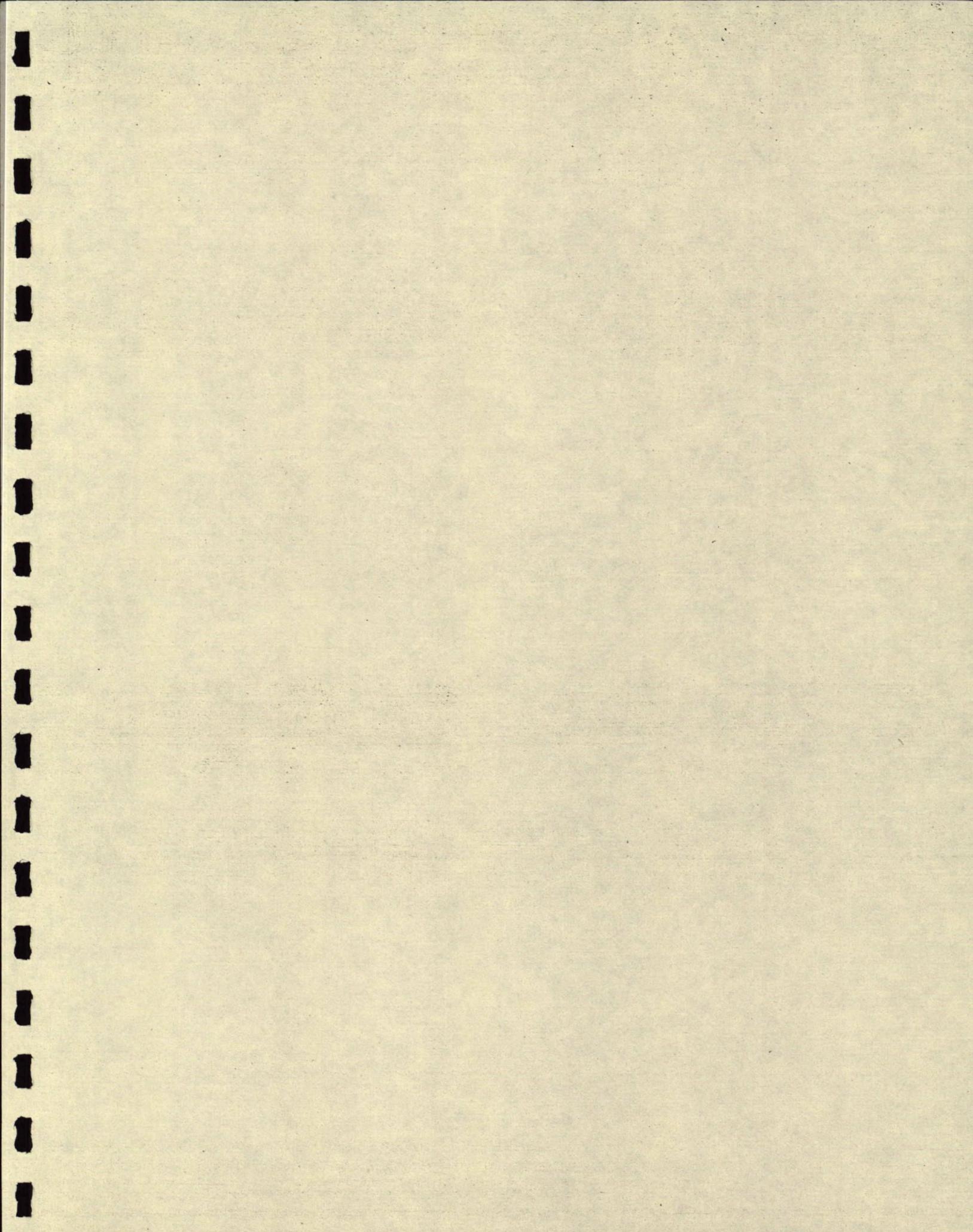
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\*\*      The Problem  
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## WHAT WE HAVE



PROB 6



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\*\*      The Solution  
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THE SOLUTION  
FOR  
DISTRIBUTED PROCESSING

SOLN 0

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\*\* The Solution \*\*  
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## Solution Options

- proprietary (single vendor)
- custom interfaces
- standards

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\*\*      The Solution  
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## Proprietary

- scope, flexibility limited by vendor
- non-competitive prices
- vendor-determined future

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\*\*      The Solution      \*\*  
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# Custom

- requires vendor cooperation
- limited scope, flexibility
- exponential cost growth

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\*\*      The Solution      \*\*  
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## International Standards

- multi-vendor compatibility
- world-wide market scope
- competitive pricing
- reduced costs: development  
implementation  
maintenance

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\*\*      The Solution  
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## The Solution

- Standard modular communication components
- Standard message and data structures
- Standard application services
- Standard management functions

WIDELY ACCEPTED STANDARDS

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\*\*      The Solution  
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SOLN 6

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**OSI**

INTERNATIONAL STANDARDS

for

Computer Communication

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\*\*      The Solution  
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# OPEN SYSTEM

A computer system whose  
COMMUNICATION FACILITIES  
conform to the

# OSI STANDARDS

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\*\*      The Solution  
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# OSI Goals

- Framework for standards
- Architecture for system communication
- Generic protocols
- Conformance statements
- Description tools

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\*\* The Solution \*\*  
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# OSI

## Strategic Objective

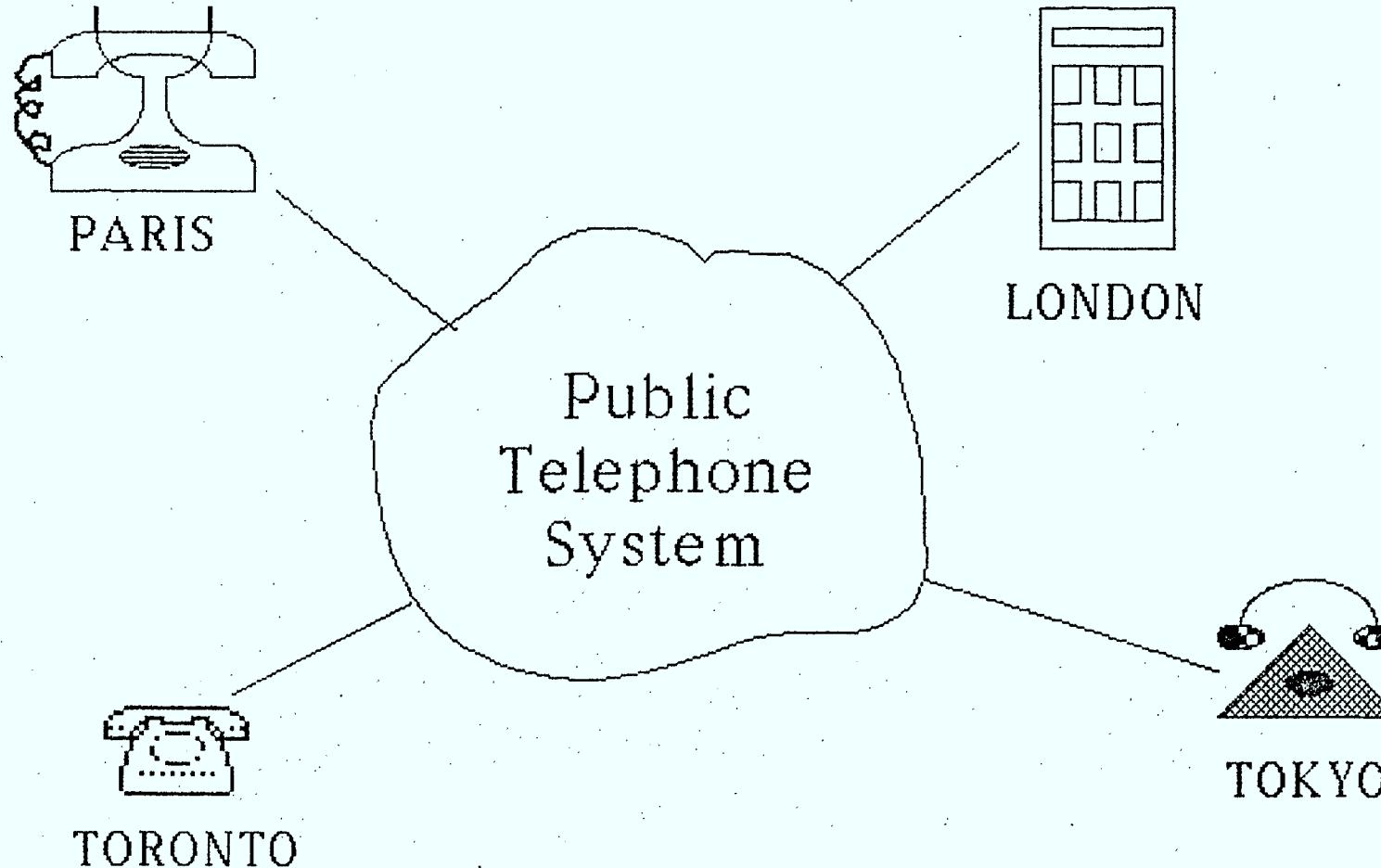
An OPEN system

can COMMUNICATE with  
any other OPEN system.

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\*\*      The Solution  
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# The Past: The Telephone Call

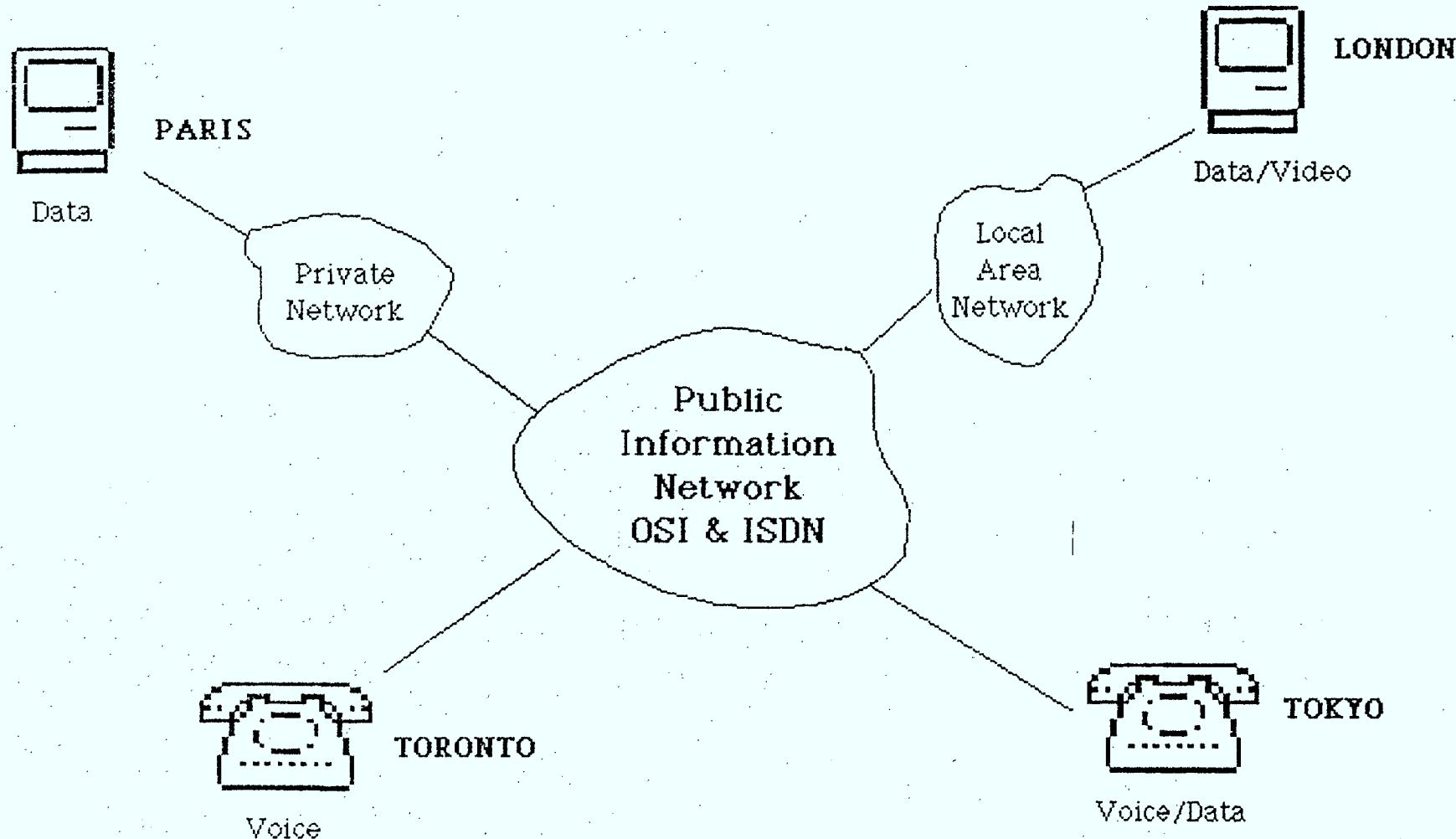


SOLN 11

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\*\* The Solution \*\*  
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# The Future: The Information Call

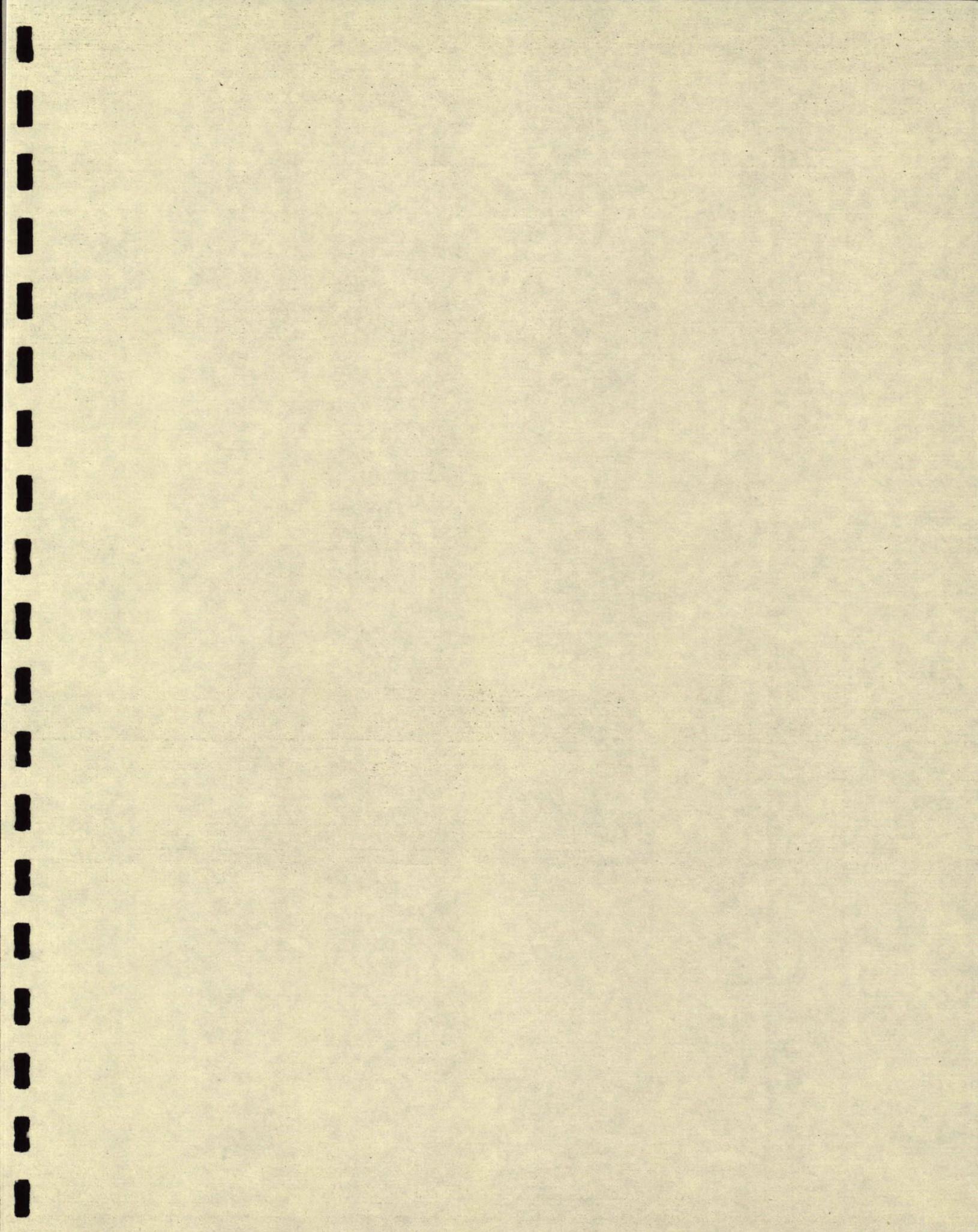


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\*\*      The Solution      \*\*  
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## 1990's Characteristics

- Ubiquitous
- Large, variable capacity per circuit
- Performance tuned for digital data
- Flexible (software defined configuration)
- Voice, data, image supported



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\*\*    OSI Architecture    \*\*  
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# ARCHITECTURE

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\*\*    OSI Architecture    \*\*  
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# ARCHITECTURE

A framework for the description of the  
logical structure and functions of a  
computer network.

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\*\*    OSI Architecture    \*\*  
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# OSI REFERENCE MODEL

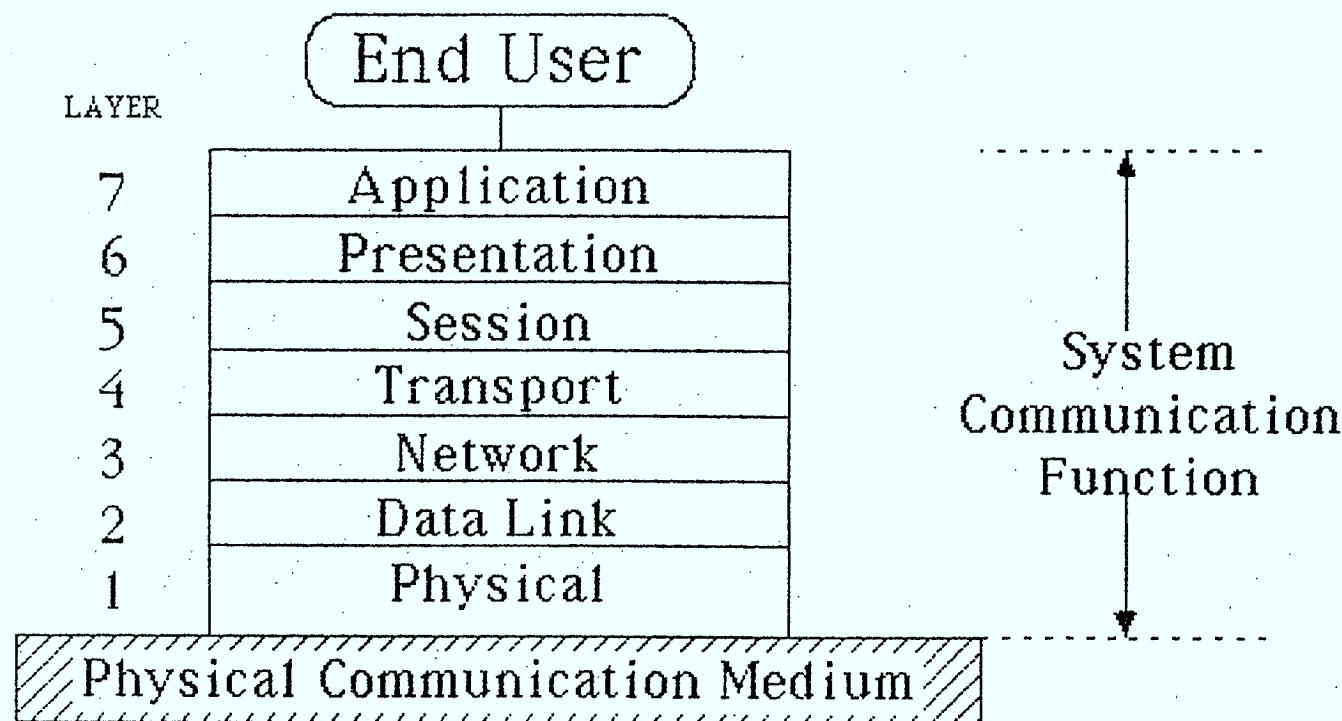
- Architecture to guide the development of standards
- Published as: ISO IS 7498  
                          CCITT Recommendation X.200

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\*\*     OSI Architecture     \*\*  
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# OSI

## REFERENCE MODEL

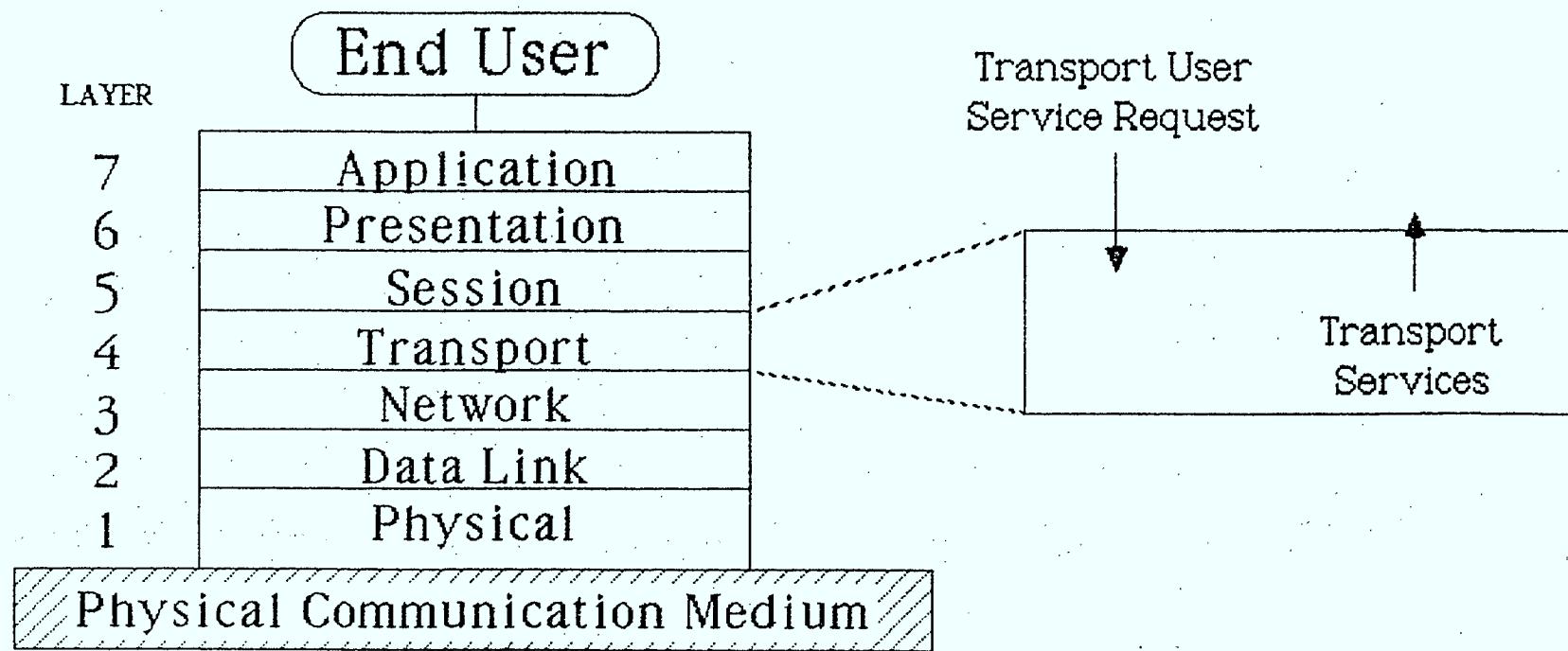


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\*\* OSI Architecture \*\*  
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# OSI

## SERVICE SPECIFICATIONS

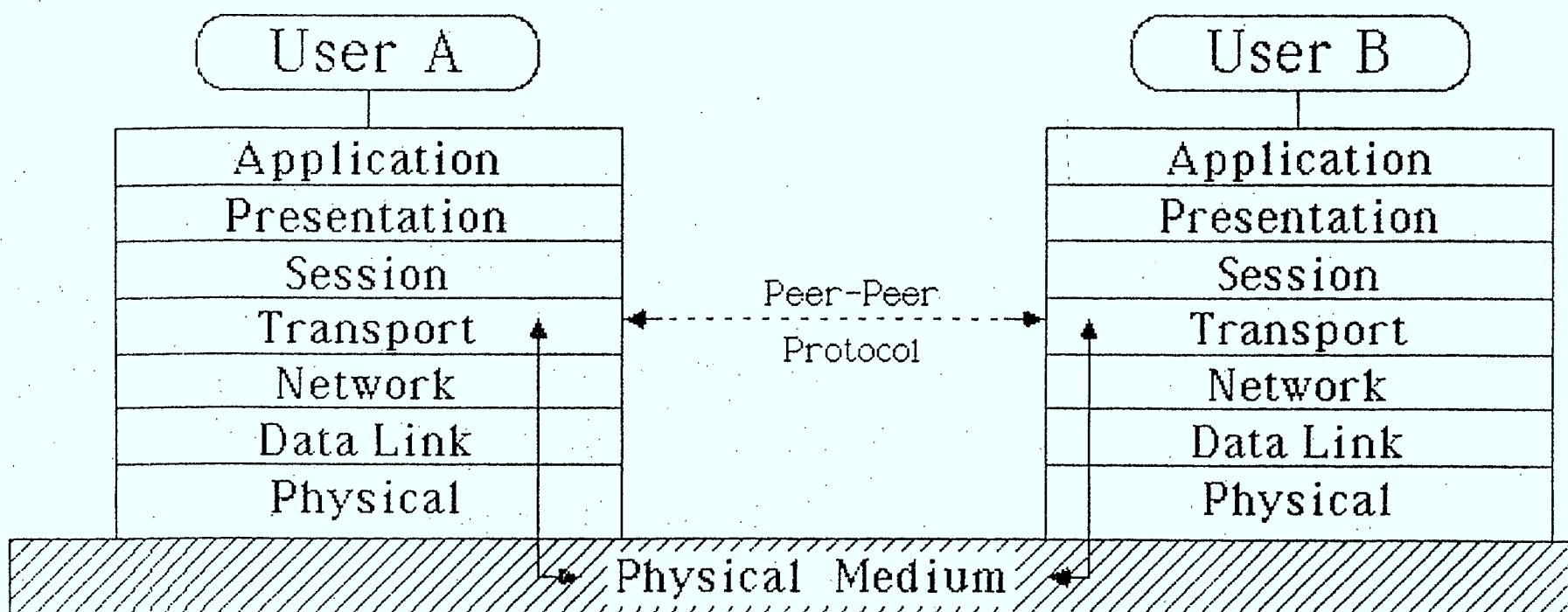


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\*\* OSI Architecture \*\*  
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# OSI

## PROTOCOL SPECIFICATIONS



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\*\*    OSI Architecture    \*\*  
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## PROTOCOL

The control information and  
the procedural rules that govern  
communication between peers

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\*\*    OSI Architecture    \*\*  
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# OSI STANDARDS

- Reference model
- Service specifications      (What)
- Protocol specifications     (How)

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\*\*    OSI Architecture    \*\*  
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# OSI

## SUPPORTIVE STANDARDS

- Formal description techniques
- Conformance testing
- System management

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\*\*    OSI Architecture    \*\*  
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# OSI

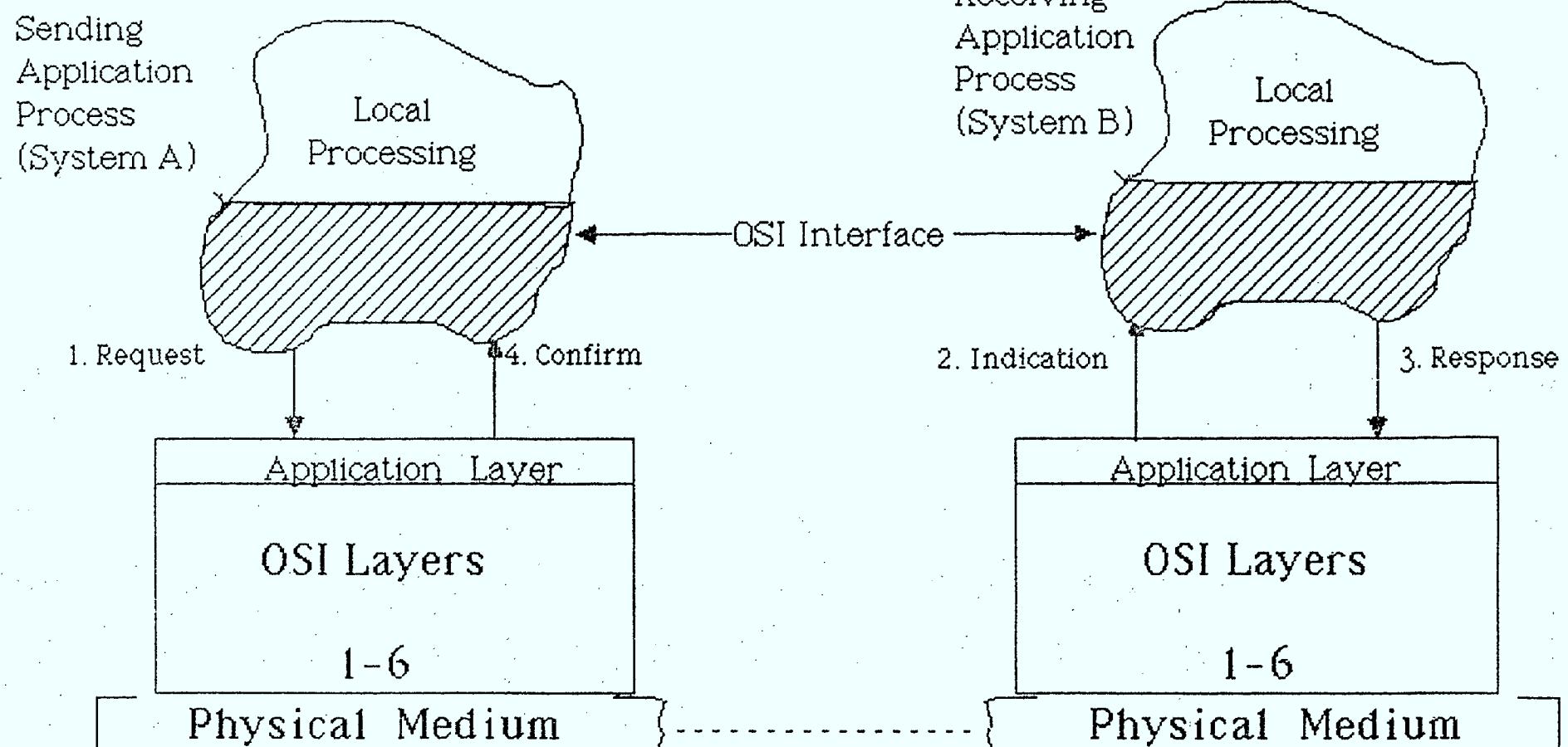
## Strategic Objective

An OPEN system can  
COMMUNICATE with any  
other OPEN system.

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\*\* OSI Architecture \*\*  
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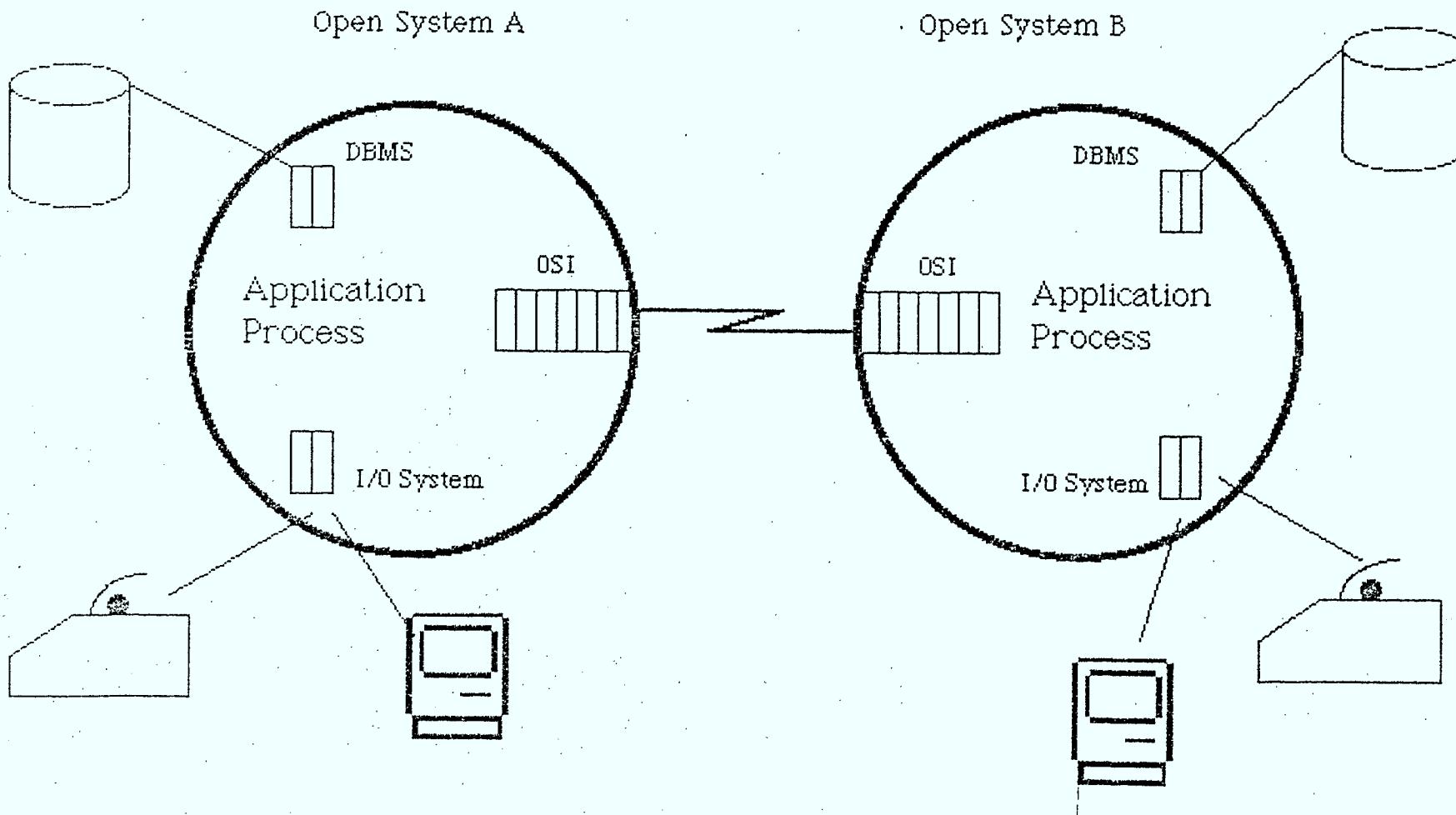
# INTER-PROCESS COMMUNICATION

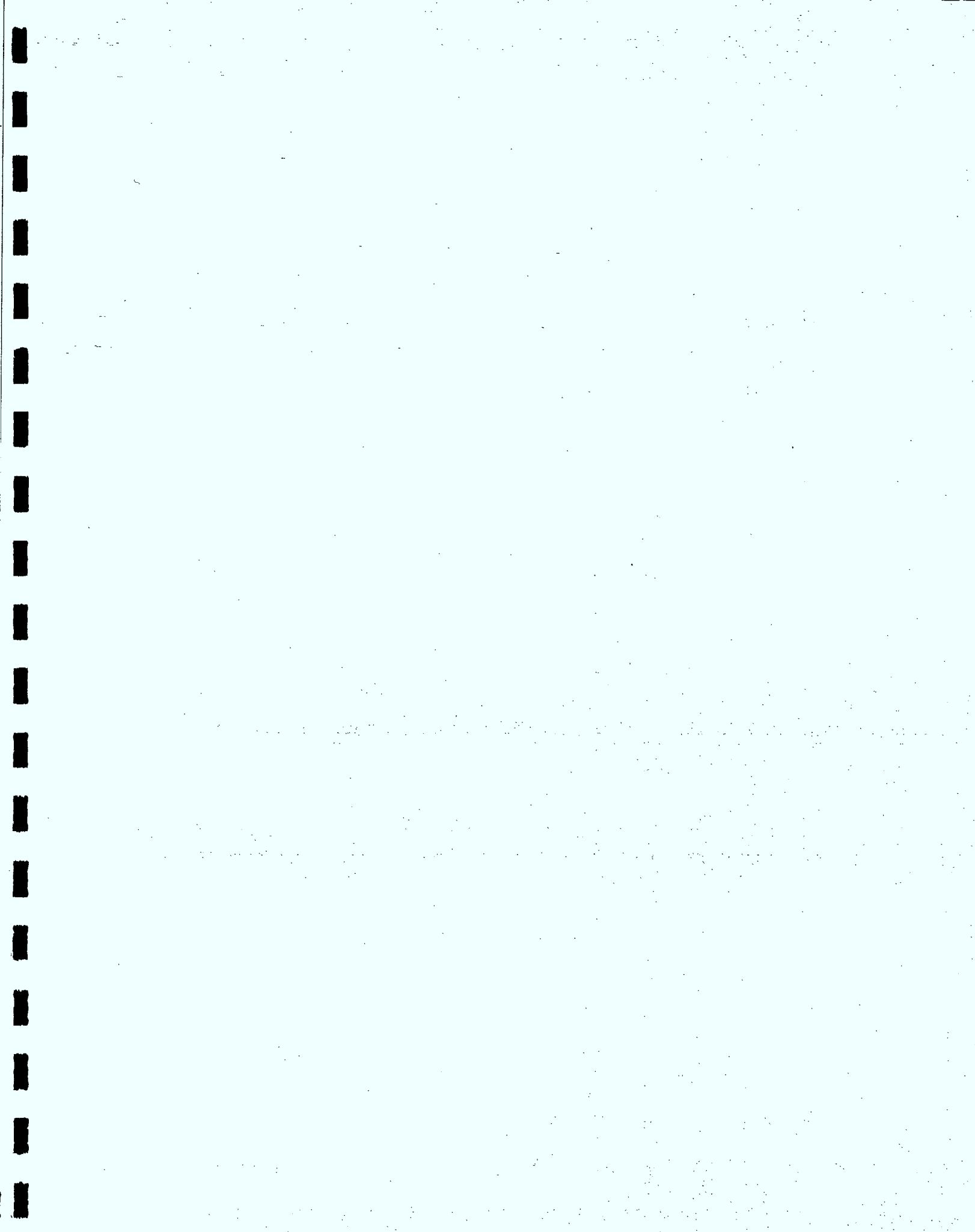


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\*\* OSI Architecture  
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# SCOPE OF OSI STANDARDS





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\*\*      OSI LAYERS      \*\*  
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# OSI LAYERS

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# OBJECTIVES

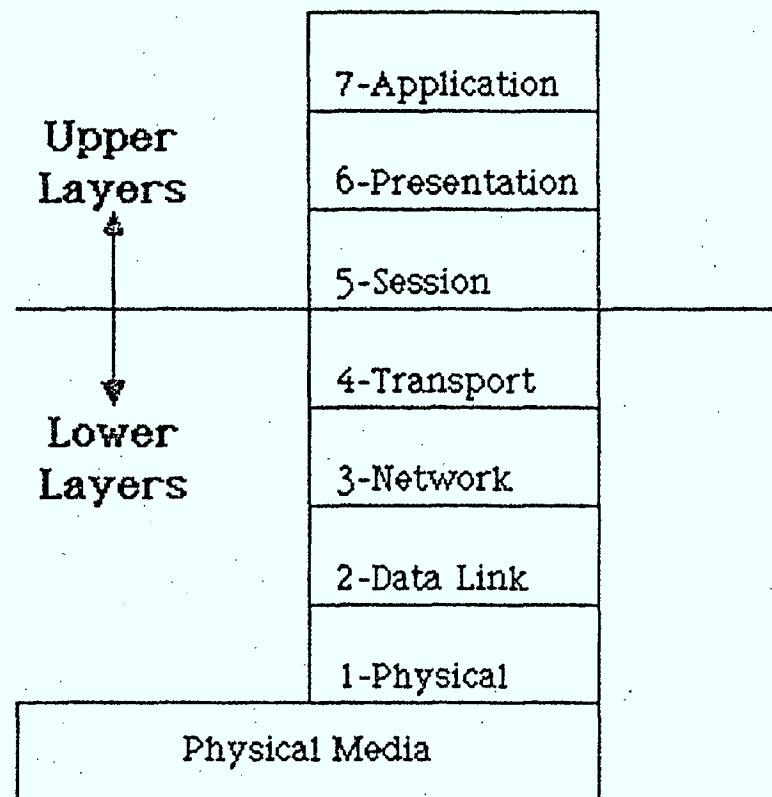
To identify

- the principal functions of each layer
- examples of standards for each layer

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\*\*      OSI LAYERS  
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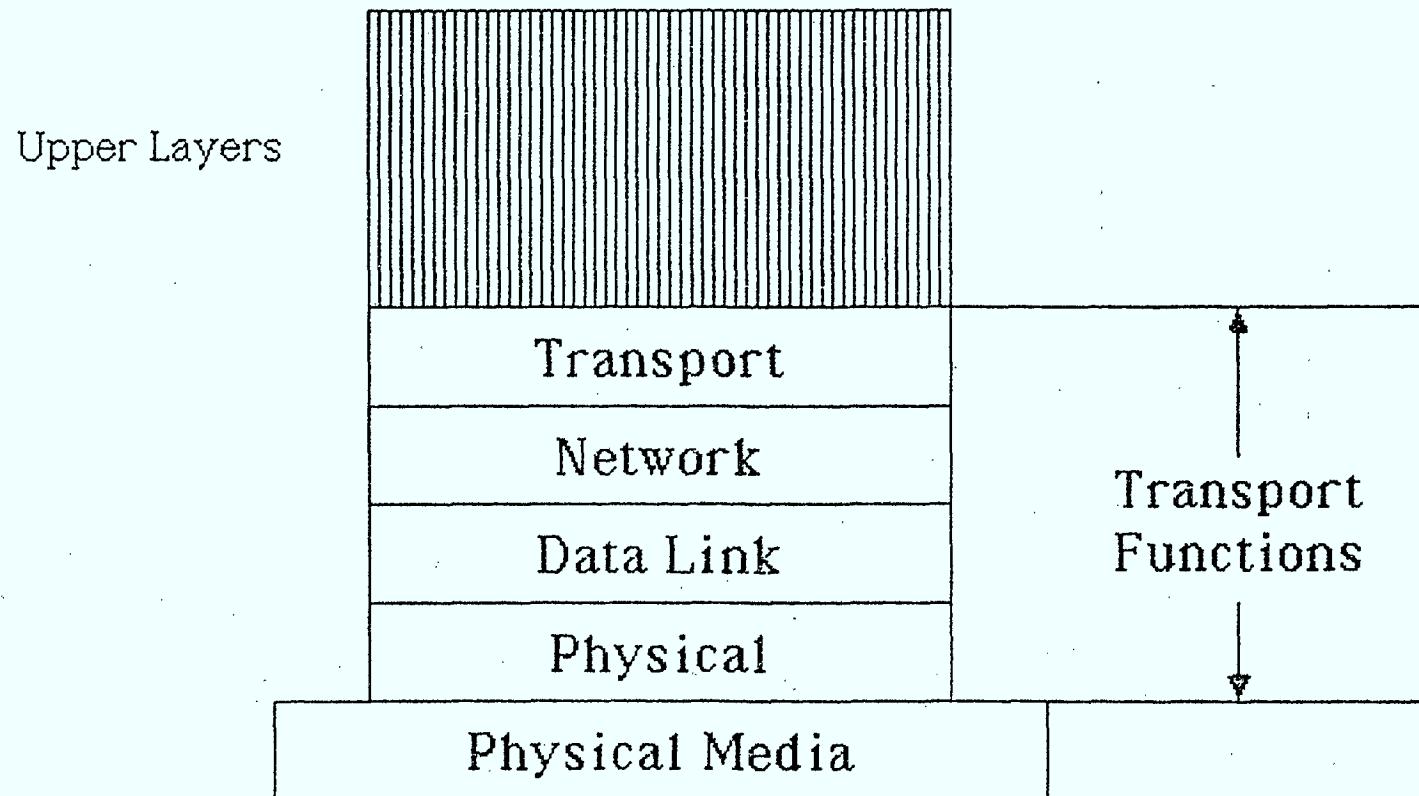
## OSI LAYERED ARCHITECTURE



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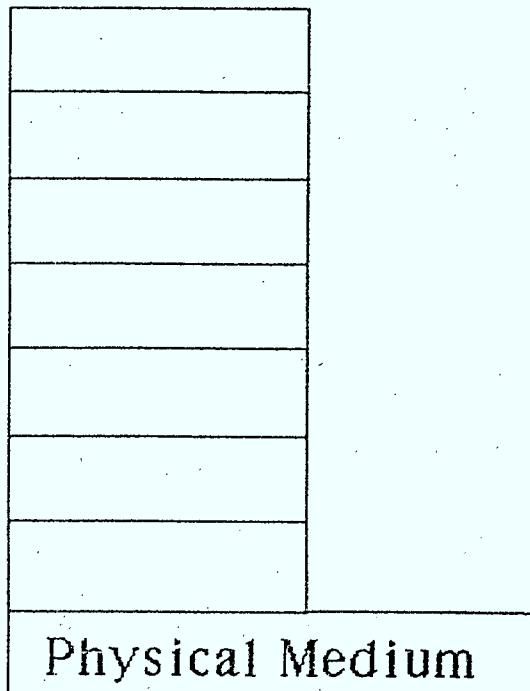
## LOWER LAYERS



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\*\*      OSI LAYERS  
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## PHYSICAL TRANSMISSION MEDIUM

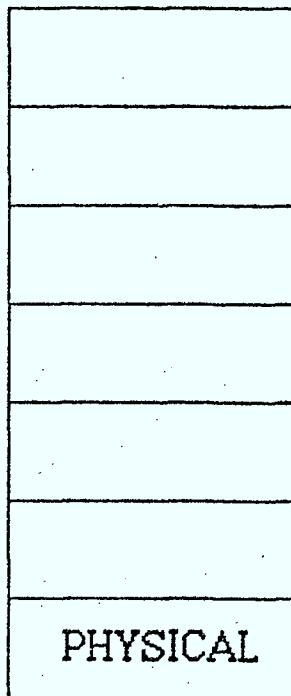


- provides the physical communication links between systems
- current media: twisted pair  
coaxial cable  
radio  
microwave  
satellite  
optical fibre

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## PHYSICAL LAYER

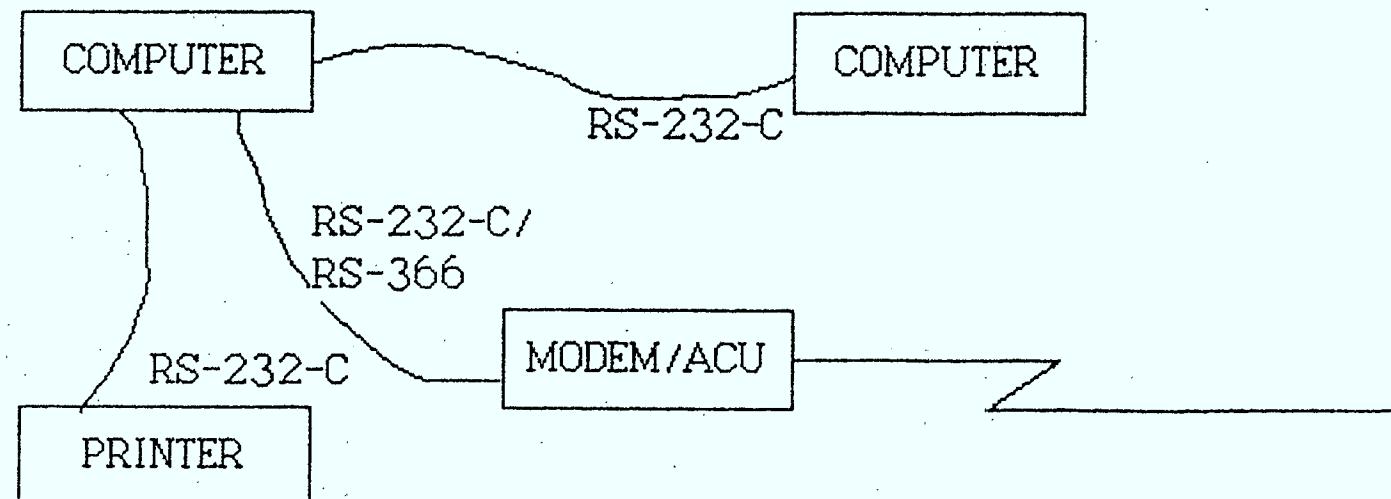


- physical interface characteristics to transmission medium
- bit transmission between adjacent systems
- standards: EIA RS-232-C/ISO 2110  
RS-449/ISO 4902  
IEEE 802.4/ISO DIS 8802/4

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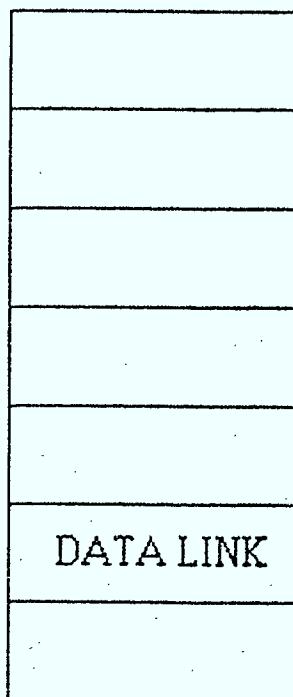
## PHYSICAL LAYER INTERFACES



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## DATA LINK LAYER

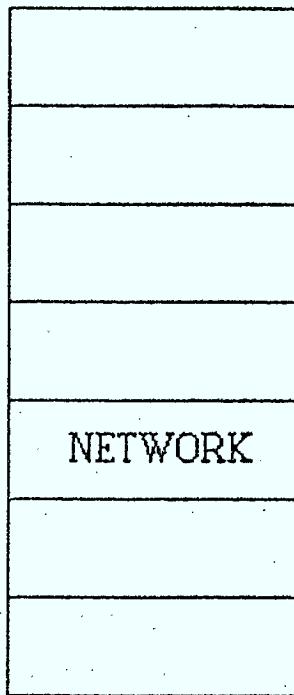


- reliable transfer across a communications link
- flow control
- error detection and recovery
- standards: ISO HDLC  
CCITT LAPB  
IEEE 802.2/ISO DIS 8802/2

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## NETWORK LAYER

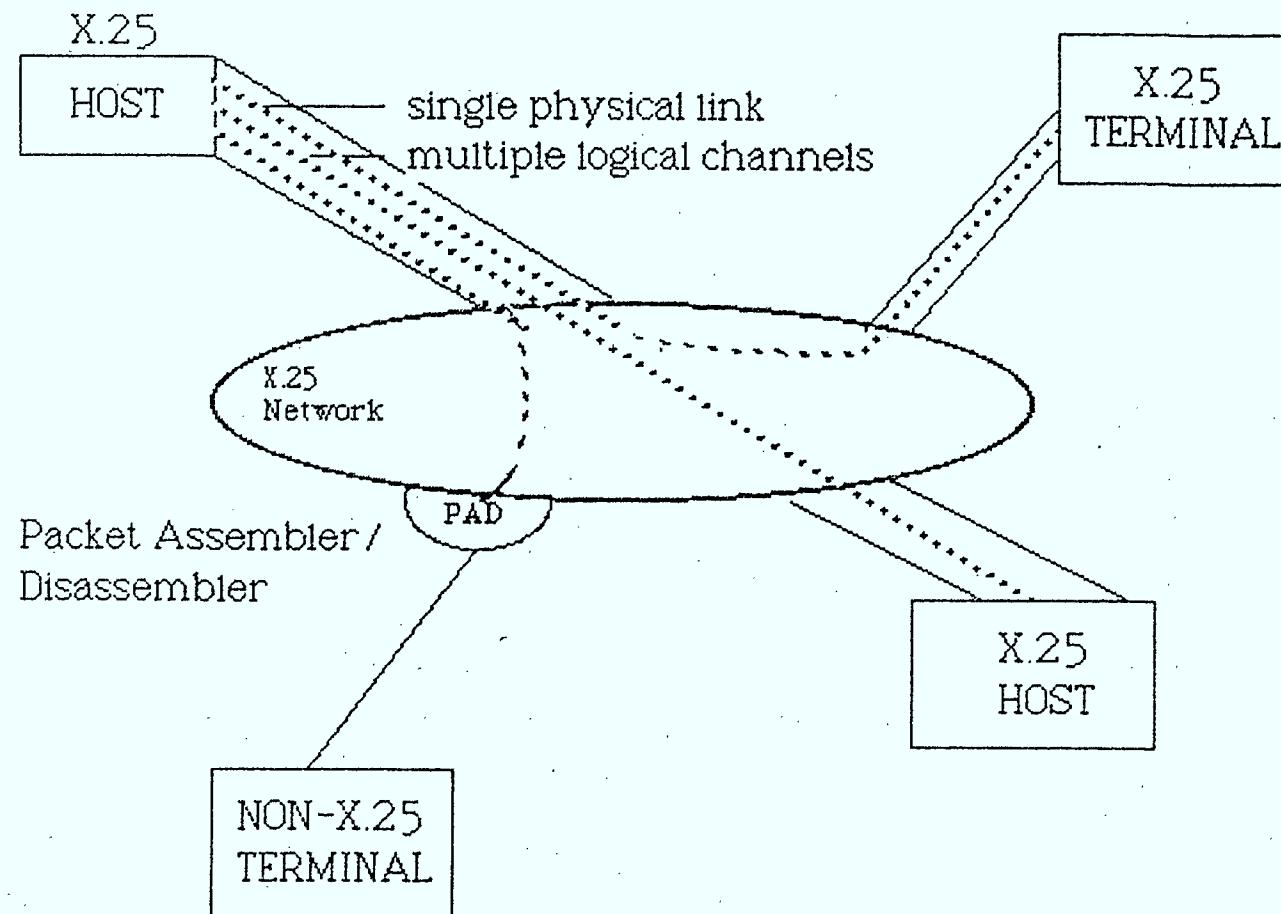


- relaying and routing
- logical channel multiplexing
- flow control
- standards: CCITT X.25,  
CCITT X.75  
ISO DIS 8348

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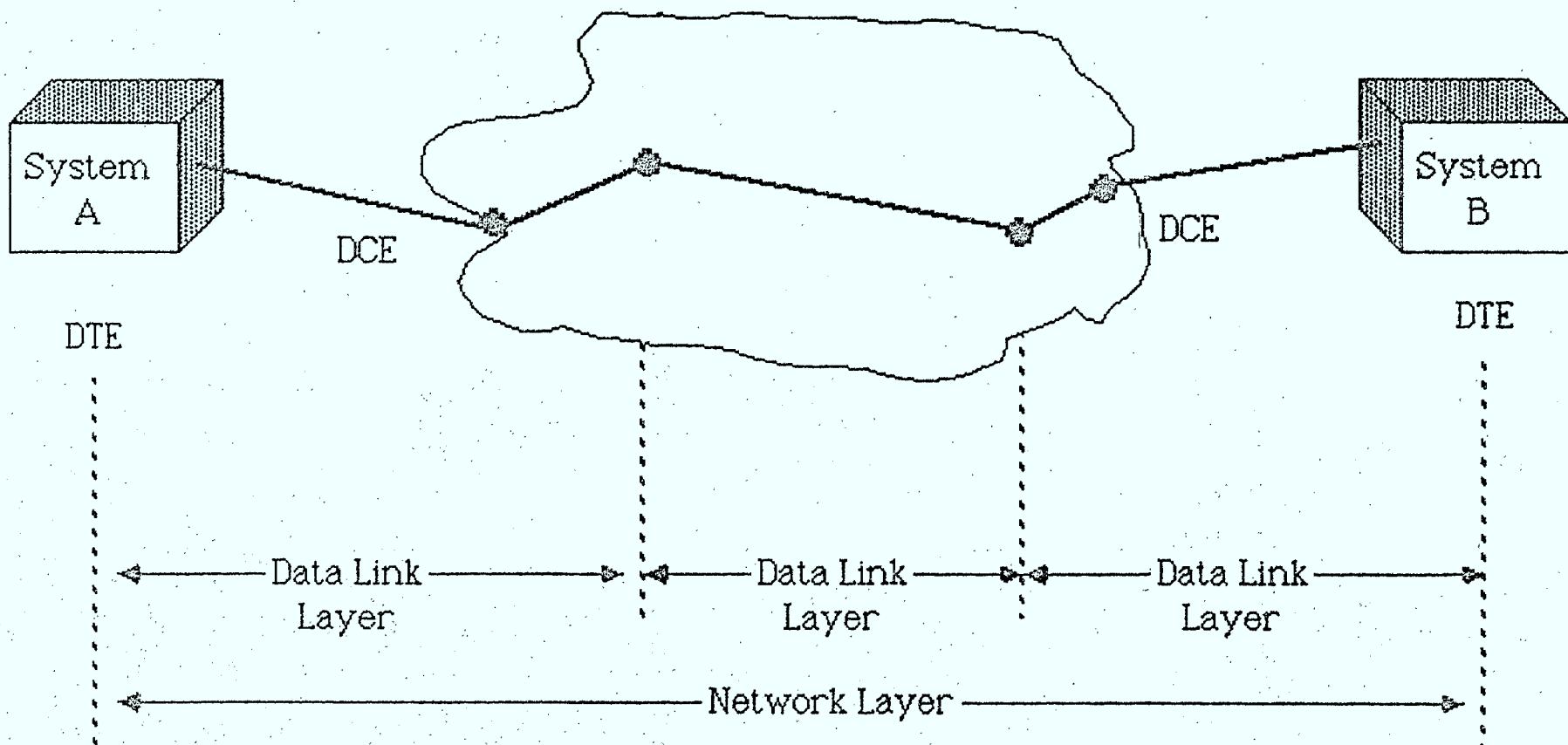
## NETWORK LAYER MULTIPLEXING



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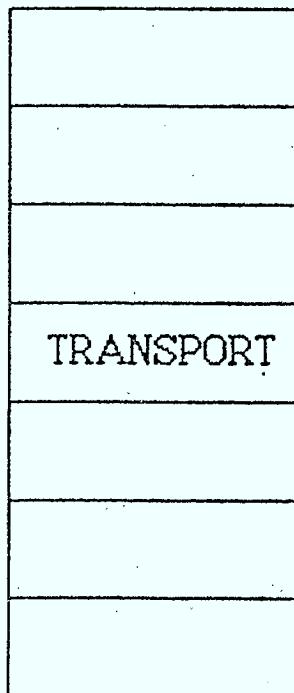
## SINGLE SUBNETWORK EXAMPLE



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## TRANSPORT LAYER



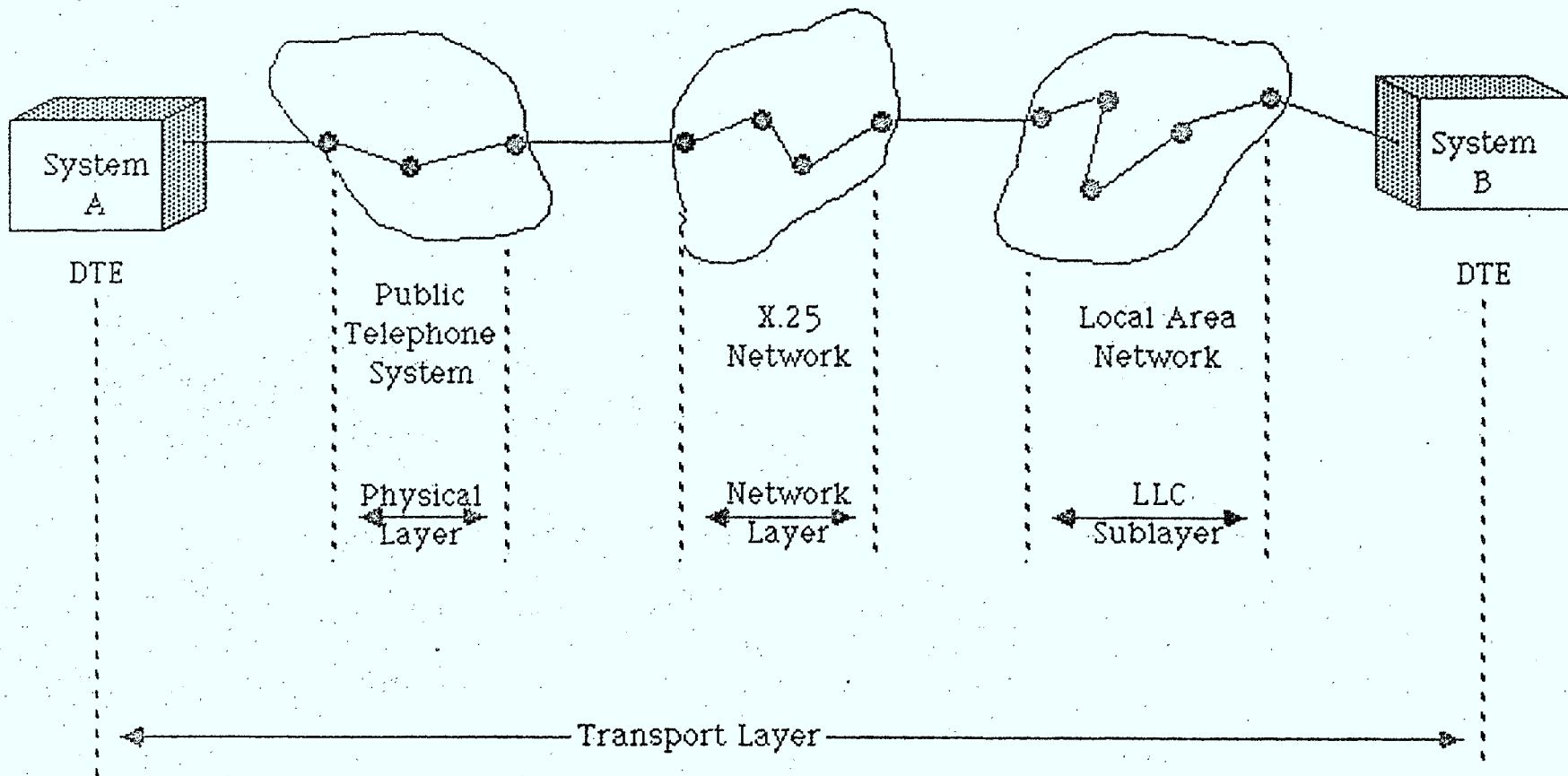
- reliable end-to-end data transfer
- error detection, recovery
- quality of service levels
- standards: ISO DIS 8072, 8073

CCITT X.214, X.224

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\*\*       OSI LAYERS       \*\*  
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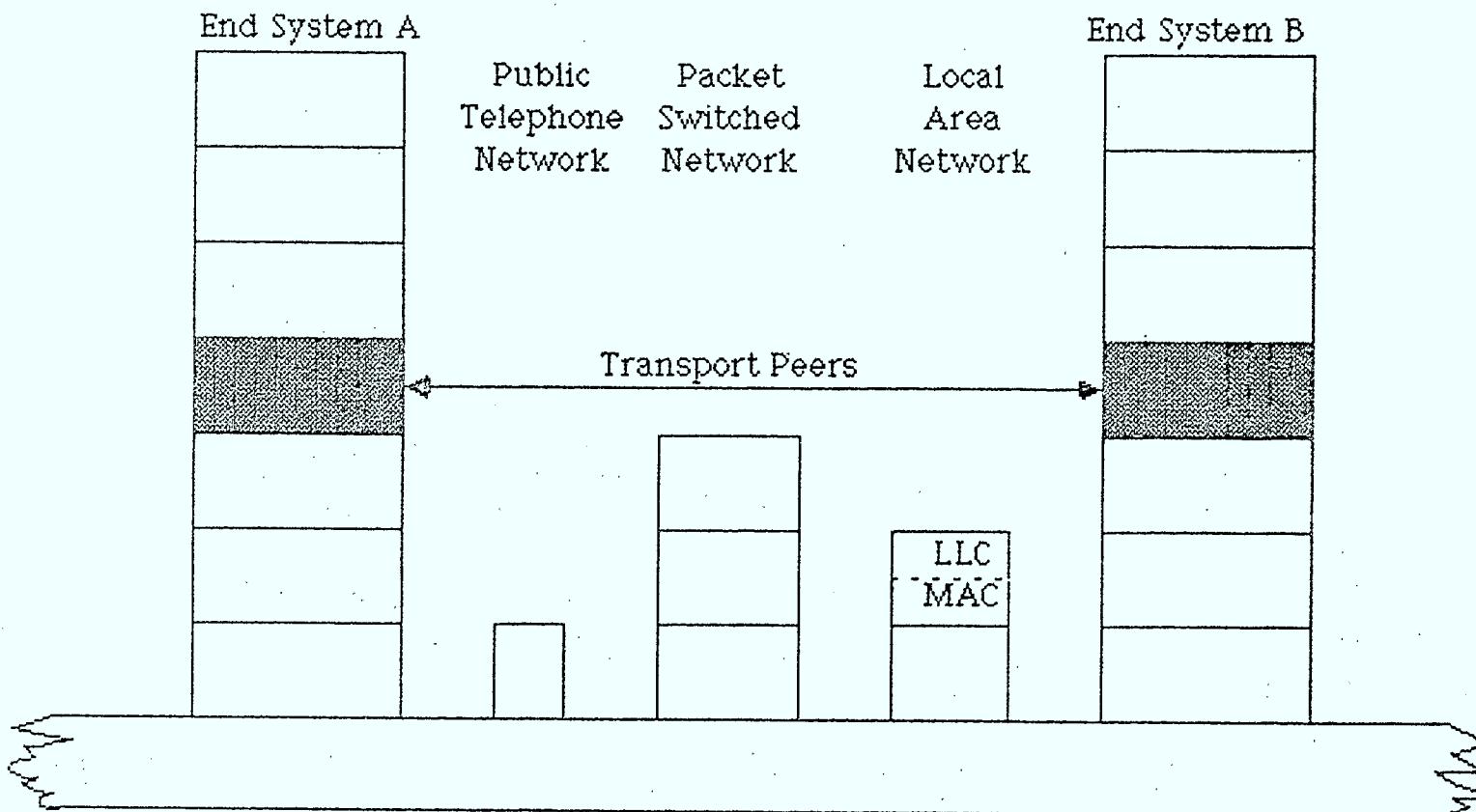
## TANDEM SUBNETWORKS EXAMPLE



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\*\*      OSI LAYERS      \*\*  
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PC

## TANDEM SUBNETWORKS - OSI LAYERS

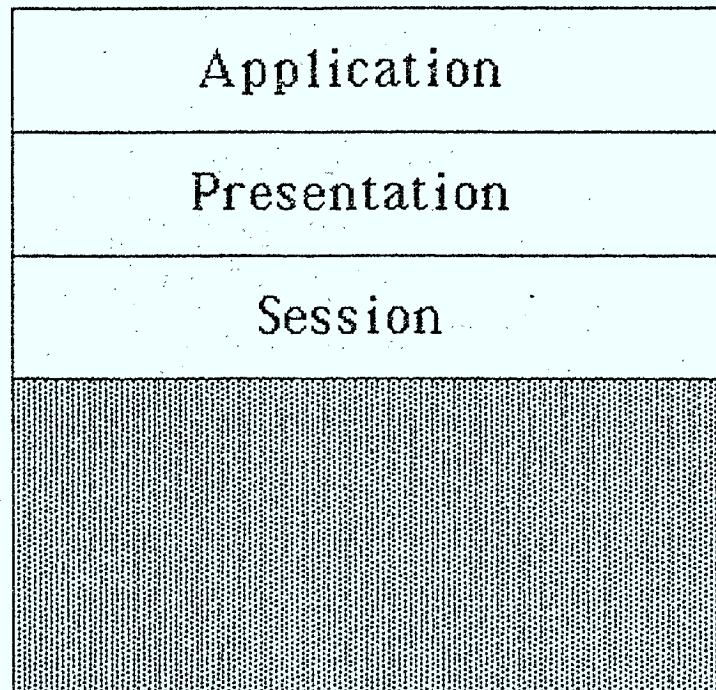


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\*\*      OSI LAYERS      \*\*  
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## UPPER LAYERS

Lower  
Layers



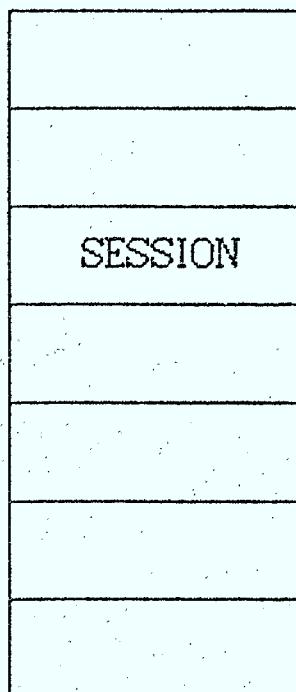
Interworking  
Functions

Transport  
Functions

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\*\*      OSI LAYERS      \*\*  
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BC

## SESSION LAYER



- dialogue control:
  - checkpoints/resynch
  - interaction management
  - interruption recovery
- optional service subsets
- standards: ISO IS 8326, 8327  
CCITT X.215, X.225

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\*\*      OSI LAYERS      \*\*  
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B/C

## ATM SESSION EXAMPLE

Initiate Session:	Insert card, enter PIN
Dialogue Control:	Two way alternate Deposit cheque Pay bill Withdraw cash
Checkpoint/Resynch:	Restart Transaction
Terminate Session:	Withdraw card

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\*\*      OSI LAYERS      \*\*  
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## SESSION LAYER

### CHECKPOINTING/RESYNCHRONIZATION

Open System A

establish session (ID:23)

send data (1)

checkpoint (1)

send data (2)

checkpoint (2)

•

•

•

send data (87)

Open System B

acknowledge (ID:23)

confirm (1)

confirm (2)

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\*\*      OSI LAYERS      \*\*  
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PTC

## SESSION LAYER

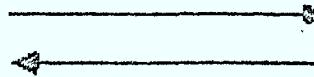
### CHECKPOINTING/RESYNCHRONIZATION (con't)

Open System A

Open System B

#### TRANSPORT ERROR REPORTED

resynchronize (86)



confirm (86)

send data (87)



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end session



acknowledge

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\*\*      OSI LAYERS      \*\*  
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PS  
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## SESSION LAYER

### ACTIVITY MANAGEMENT

Open System A

establish session (ID:23)

send data (1)

checkpoint (1)

send data (2)

checkpoint (2)

•  
•  
•

Open System B

acknowledge (ID:23)

confirm (1)

confirm (2)

•  
•  
•

confirm (86)

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\*\*           OSI LAYERS           \*\*  
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~~B/C~~

## SESSION LAYER

### ACTIVITY MANAGEMENT

(con't)

Open System A

Open System B

HIGH PRIORITY REQUEST

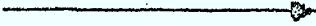
interrupt session (ID: 23)



establish session (ID: 24)

perform high priority communication

end session



continue session (ID: 23)



acknowledge



acknowledge (ID: 23)

send data (87)



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end session

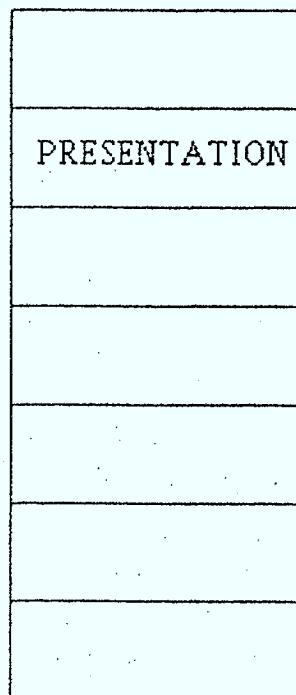


acknowledge

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\*\*       OSI LAYERS       \*\*  
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## PRESENTATION LAYER



- negotiates the representation of the exchanged information (transfer syntax)
- maps local syntax to/from transfer syntax as required
- standards: ISO DIS 8822, 8823 (ASN.1)  
VIDEOTEX (NAPLPS)  
CCITT X.409

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\*\*      OSI LAYERS  
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## PRESENTATION LAYER

e.g.: 'John Smith', 4365  
system A: ASCII,            binary  
system B: EBCDIC,          packed decimal  
transfer syntax: ASCII,     hexadecimal

OPEN SYSTEM A  
(ASCII, binary)  
'John Smith', 4365

OPEN SYSTEM B  
(EBCDIC, packed decimal)  
'John Smith', 4365

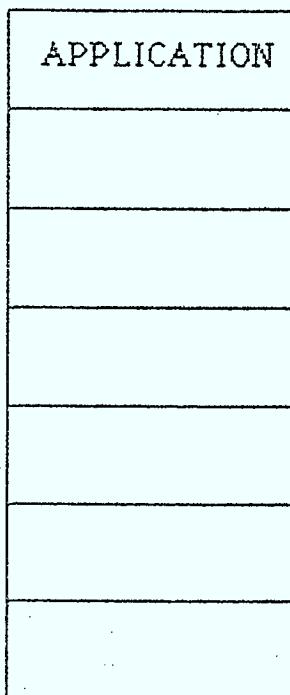
- 
- 1) no encoding for name
  - 2) encode number from binary to hex

- 1) decode name from ASCII to EBCDIC
- 2) decode number from hex to packed decimal

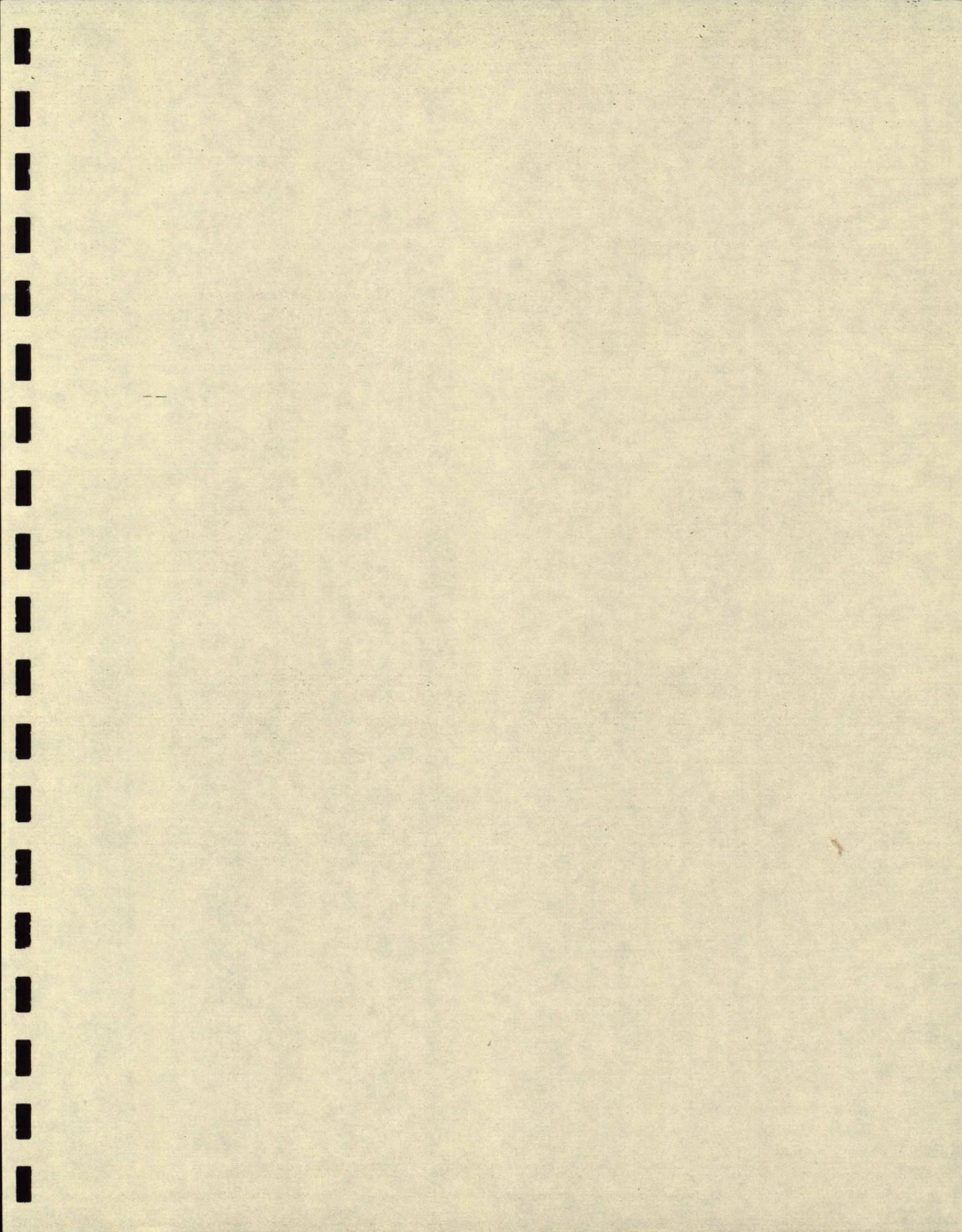
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\*\*      OSI LAYERS      \*\*  
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## APPLICATION LAYER



- provides all OSI services available to the application process
- specifies the content and logical format of the information exchanged
- OSI service categories:
  - COMMON (CASE) - Establish/Release Association...
  - SPECIFIC (SASE) - FTAM, MHS...



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\*\*    OSI Applications    \*\*  
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*PKC*

OSI

APPLICATION

SERVICES

OSIAS 0

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\*\*    OSI Applications    \*\*  
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PKC

## TYPICAL DISTRIBUTED APPLICATIONS

File Transfer

Messaging

Office Automation

Factory Automation

Electronic Data Interchange

Remote Job Processing

Management Services

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\*\*    OSI Applications    \*\*  
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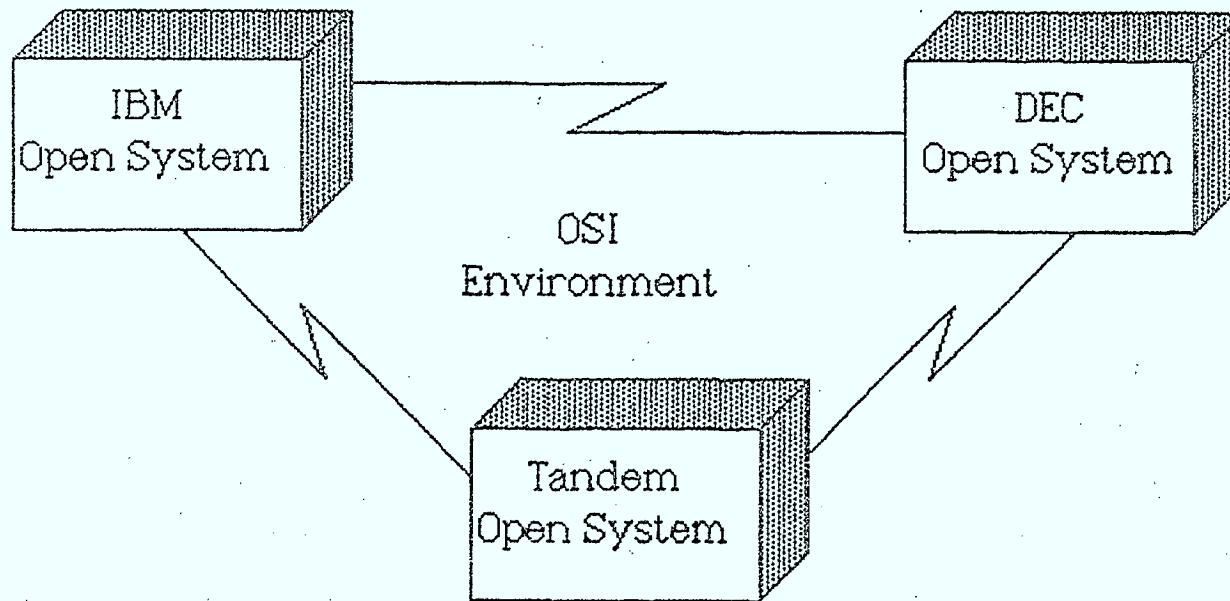
## Typical OSI Application Services

- FTAM**      - File Transfer Access and Management
- MHS**       - Message Handling System
- TELETEX** - Text Transmission
- MAP**       - Manufacturing Automation Protocol
- TOP**       - Technical and Office Protocol
- EDI**       - Electronic Data Interchange

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\*\*      OSI Applications      \*\*  
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## FILE TRANSFER ACCESS AND MANAGEMENT (FTAM)

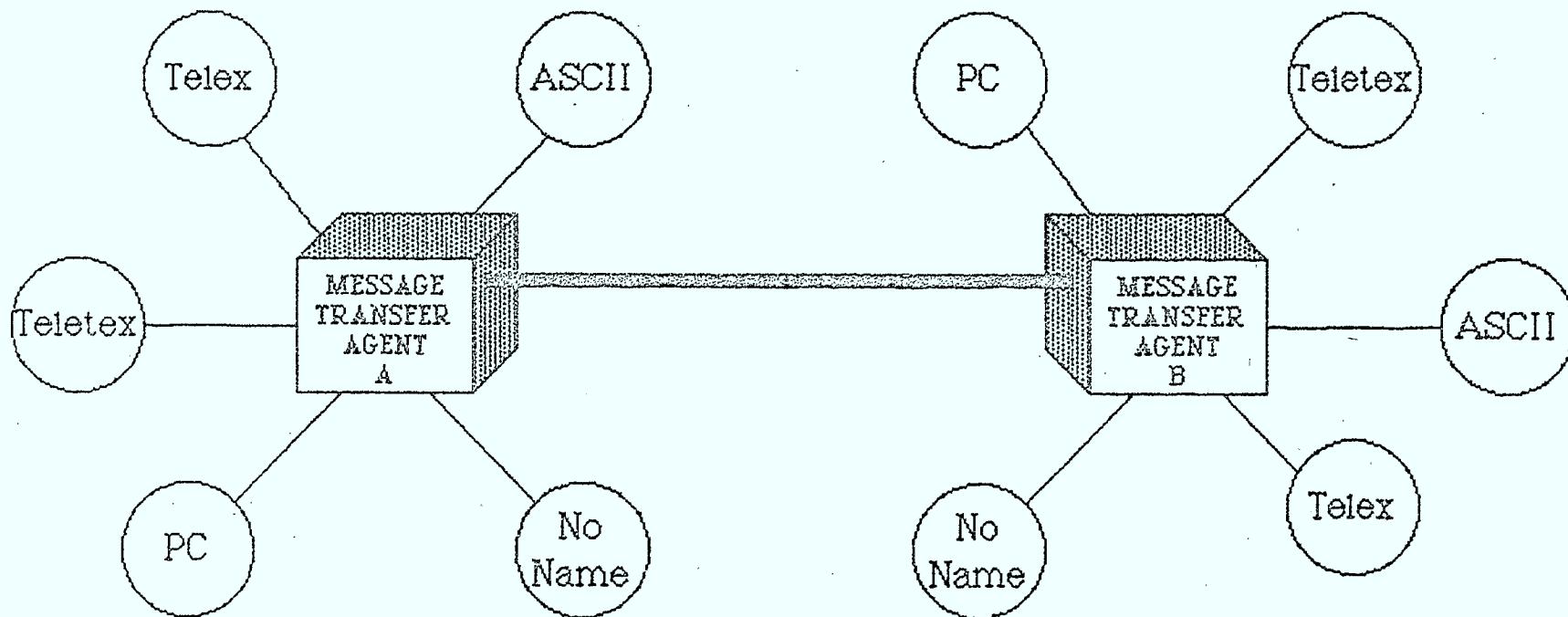


- allows file transfer and access among open systems
- standard intermediate file structure (Virtual Filestore)
- local file structure mapped onto Virtual Filestore

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\*\*      OSI Applications      \*\*  
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## MESSAGE HANDLING SYSTEM (MHS)

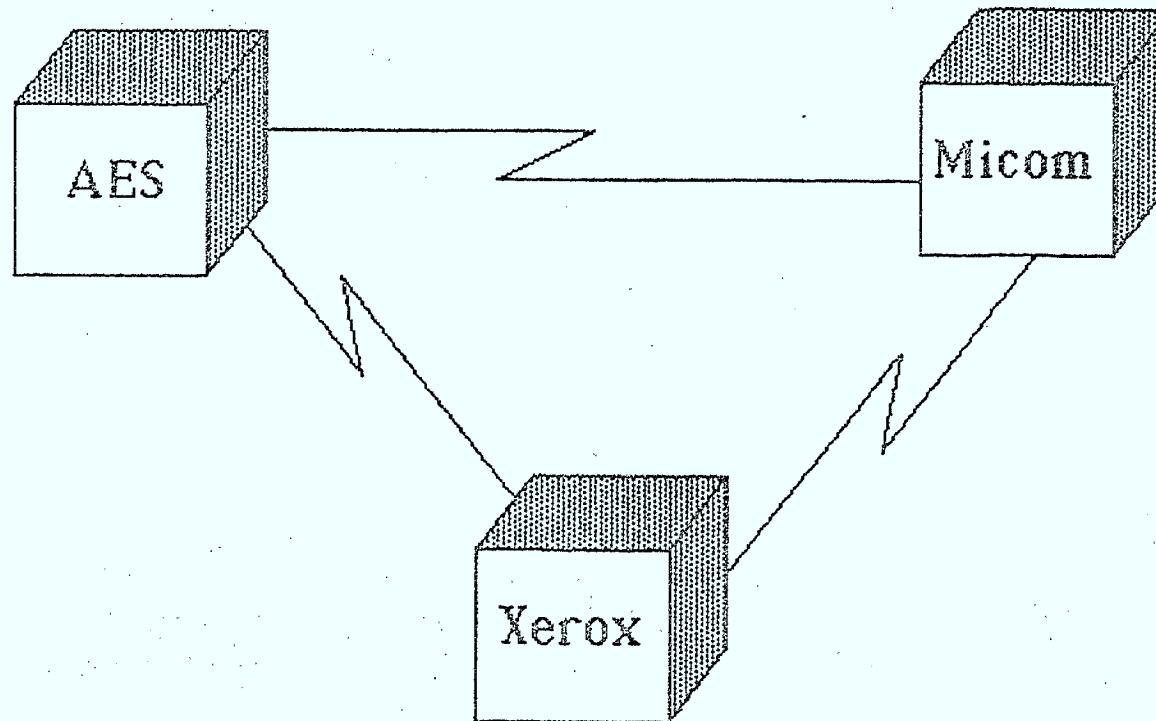


- message creation, editing, transfer
- store and forward service
- Envoy 100, GTE Telenet (MTA's)

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\*\*     OSI Applications     \*\*  
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# Teletex

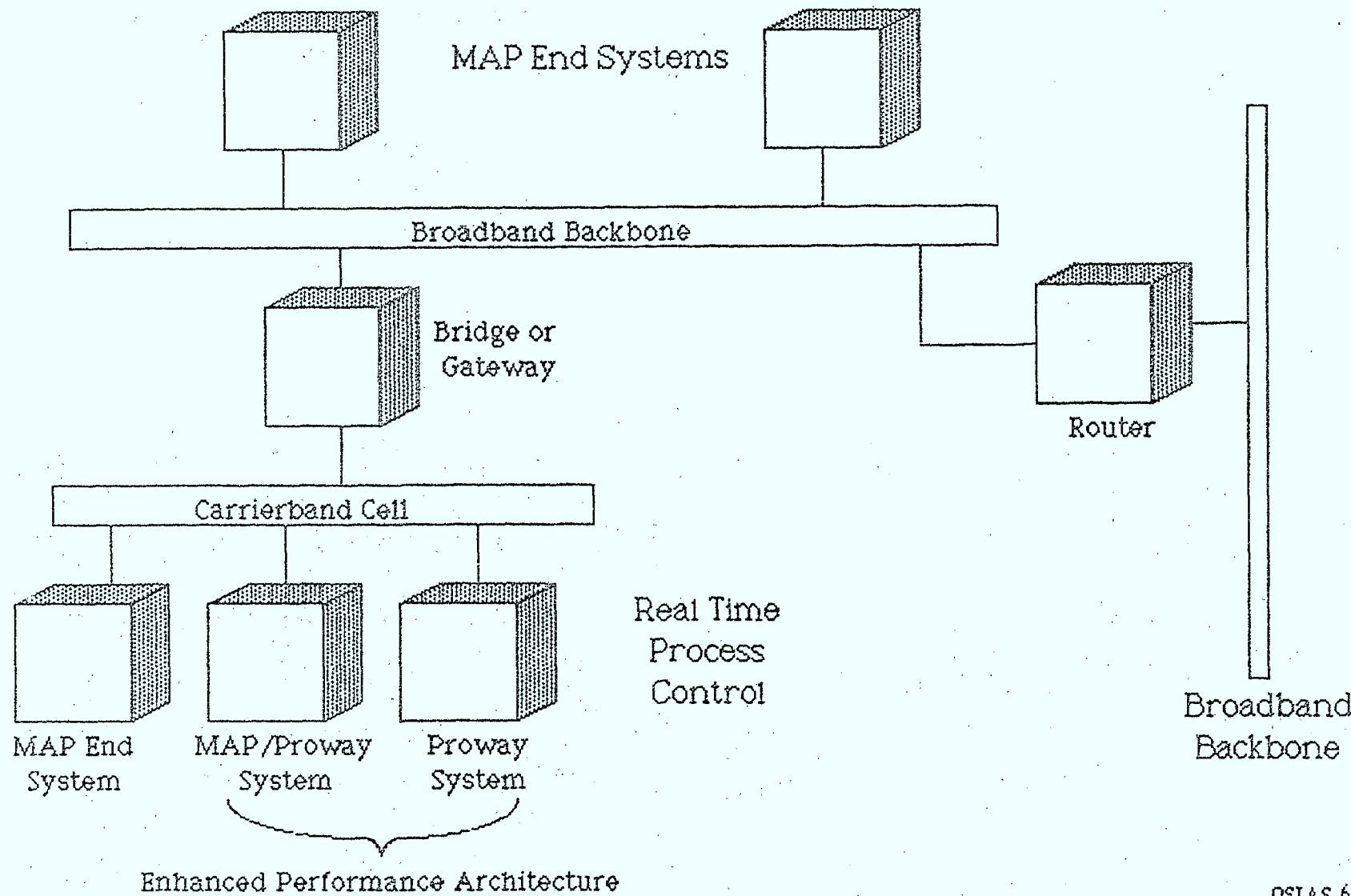


- word processors, electronic typewriters
- send/receive formatted documents
- can operate unattended or while performing text manipulations

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\*\* OSI Applications  
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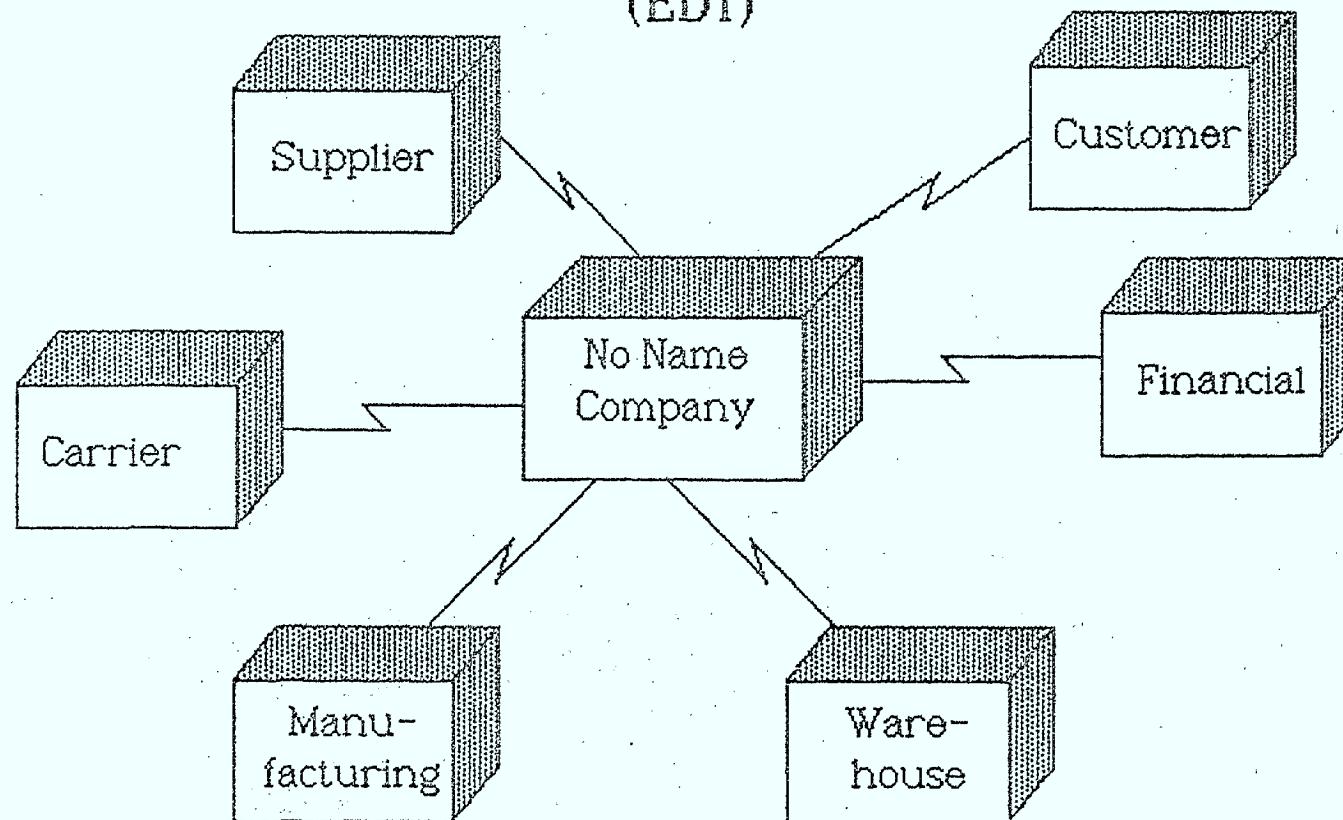
# A MAP Network



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\*\*      OSI Applications      \*\*  
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PKC

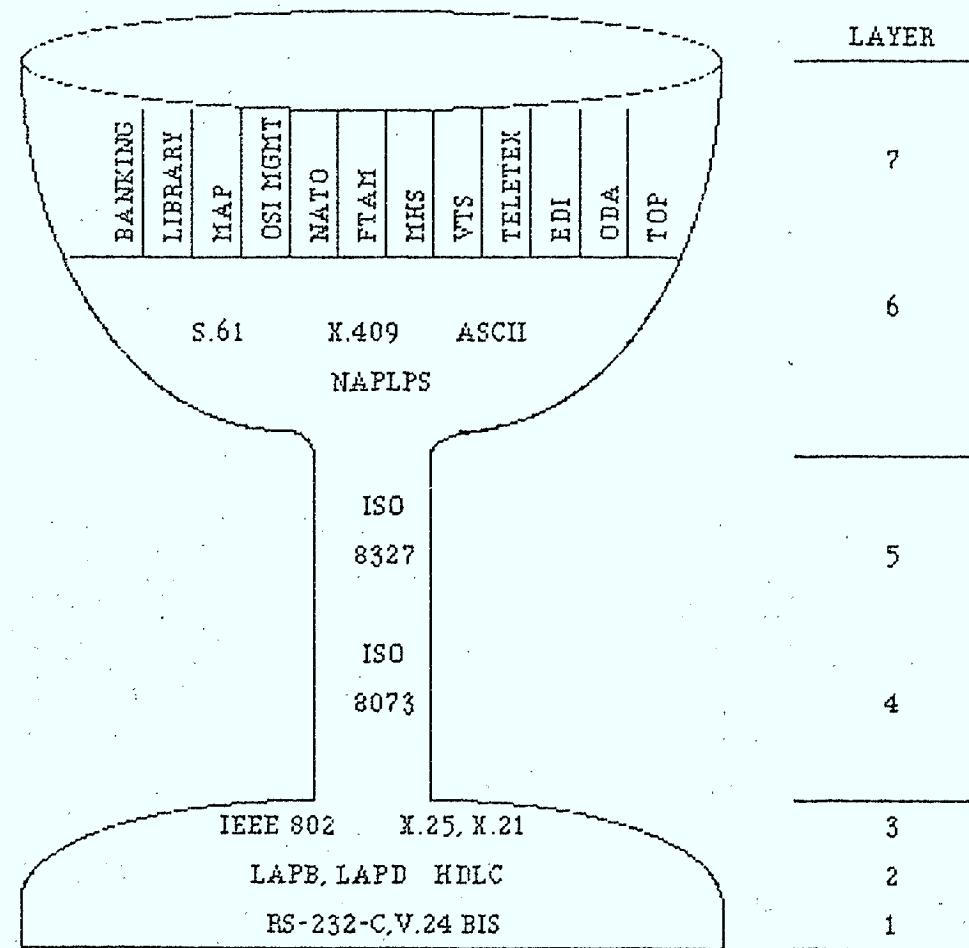
## ELECTRONIC DATA INTERCHANGE (EDI)

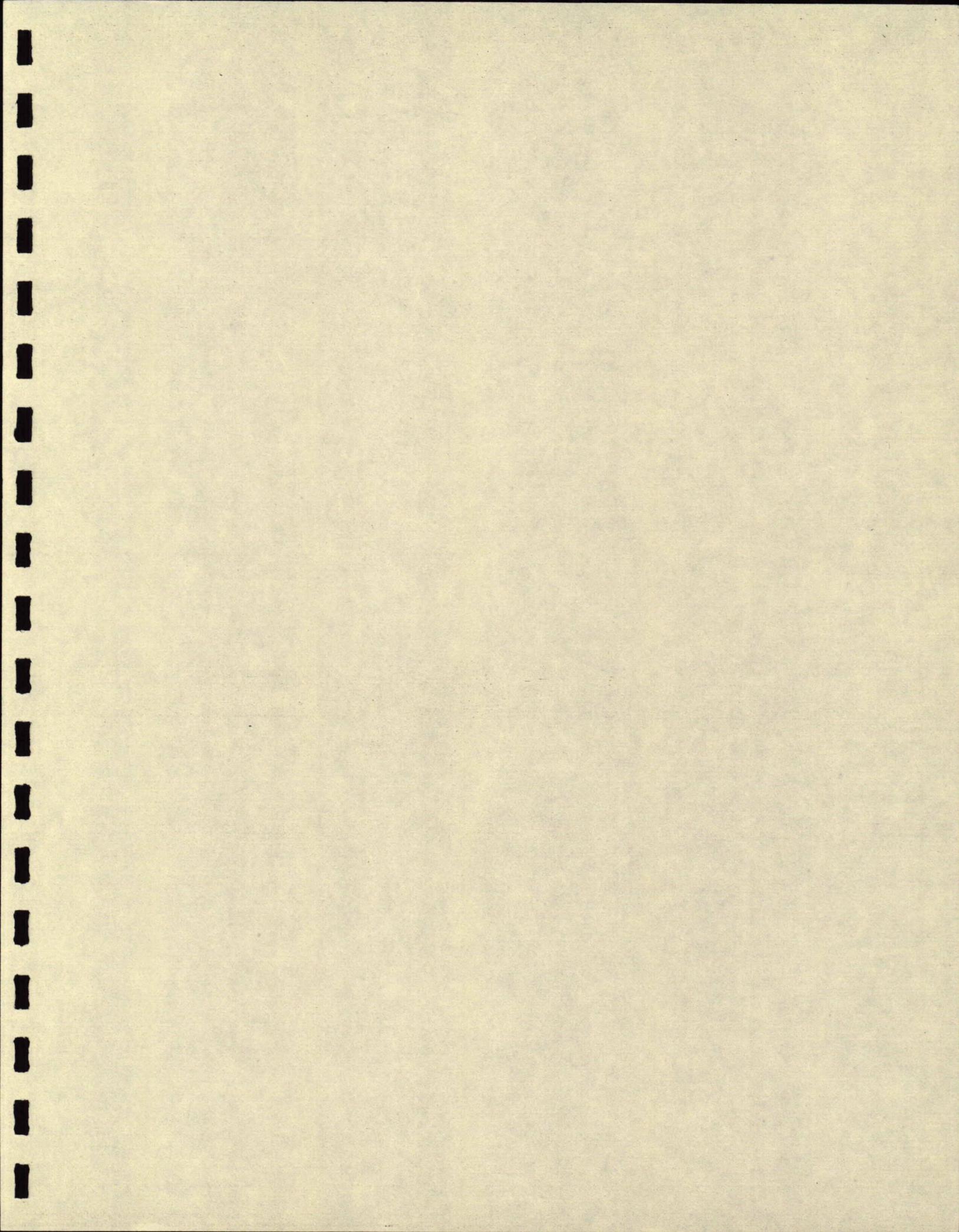


- standard business transactions - p.o.'s, invoices, etc.
- within and among companies, industries
- Transportation, Food, Drug, Automotive, Warehouse

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\*\*\* OSI WINE GLASS \*\*\*  
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\*\* The Promise \*\*  
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BC

THE  
OSI  
PROMISE

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\*\*      The Promise      \*\*  
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P/C

- Does OSI really exist?
- Who provides OSI?
- What does OSI promise?

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\*\* The Promise \*\*  
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## Current OSI-Based Implementations

### MHS (X.400)

- EAN - developed at U.B.C., marketed by Sydney Development Corp.
- NT implementation for Meridian products
- Telecom Canada Envoy 100 connection to GTE Telemail (U.S.)
- carriers in U.S., Europe, Japan
- major vendors in U.S., Europe, Japan

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\*\*      The Promise      \*\*  
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## Current OSI-Based Implementations

### FTAM

- specified for MAP (GM), TOP (Boeing)
- demo at NCC '84, Autofact '85
- implemented by National Library of Canada
- commercial implementations by IBM, DEC, MAP, TOP vendors, major vendors

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\*\*      The Promise      \*\*  
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## Current OSI-Based Implementations

### TELETEX

- implemented in Europe and Far East  
(more than 30,000 machines)
- commercially available in Canada

### EDI

- implemented in Food, Drug, Transportation,  
Automotive Manufacturing industries to  
save costs

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\*\*      The Promise      \*\*  
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## Current OSI-Based Implementations

### MANUFACTURING AUTOMATION PROTOCOL (MAP)

- GM Local Area Network Standard
- multi-vendor factory environment
- endorsed by many leading manufacturers
- V2.1 implements OSI layers 1, 2, part of 3, 4, 5, 7
- demo at AUTOFACT, Nov. '85
- MAP products now available

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\*\*      The Promise      \*\*  
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## Current OSI-Based Implementations

### TECHNICAL OFFICE PROTOCOL (TOP)

- Boeing Local Area Network Standard
- technical and office
- developed jointly with GM
- joint demo with MAP at AUTOFACT, Nov. '85
- TOP products now available

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\*\*      The Promise      \*\*  
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## Manufacturers Support for OSI (U.S.)

- Corporation for Open Systems (Sept. 1985)
- 17 founding members (manufacturers)
- currently more than 50 members
- membership also includes users, carriers
- international membership

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\*\*      The Promise  
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## COS Goals

- accelerate development of standards in critical areas
- define specific sets of protocols for given applications
- develop and implement interoperability tests for independently developed products

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\*\* The Promise \*\*  
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## COS Membership List (April '86)

AT&T*	Data General	Intel	Tandem*
Amdahl*	Digital Equipment*	ITT	Telex*
Apollo Computer	Dow Chemical	NCR*	Texas Instruments
Apple Computer	DuPont Co.	National Semiconductor*	Touch Comm.
Bechtel Power	Eastman Kodak	Northern Telecom*	Wang*
Bellcore*	Excelan	Pacific Bell	Xerox*
Boeing Computer Services	GTE Telenet	Prime Computer	
Burroughs*	Harris Corp.*	Proctor & Gamble	
Concurrent Computer	Hewlitt-Packard*	S.E.L. Computer Systems	
Control Data*	Hughes Aircraft	Sperry Corp.*	
Convergent Technologies	Honeywell*	Sun Microsystems	
Dart & Kraft	IBM	Sytek	

\* founding member

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\*\* The Promise \*\*  
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## IBM Support for OSI

- Statement of Direction
- OSNS
- OTSS
- Series 1 MAP Products
- BILDSCHIRMTEXT (Videotex)
- UK POS Project
- TELETEX (Europe)
- Token Ring LAN

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\*\* The Promise \*\*  
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## DIGITAL Support for OSI

- complete integration of OSI protocols in DECnet
- interim OSI products: Message Router X.400 Gateway  
VMS Transport Layer (VOTS)  
VMS Session Layer (OSAK)  
X.25 (1984) (PSI)
- LAN products: Ethernet  
IEEE 802.3 (TOP)  
IEEE 802.4 (MAP)

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\*\*      The Promise      \*\*  
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## Manufacturer Support for OSI (Europe)

- Standards Promotion and Application Group (SPAG)
- manufacturers only (c.f. COS)
- sponsored by E.E.C.

AEG	Telefunken	ICL	Plessey
Bull		Nixdorf	Siemens
CGE		Olivetti	STET
GEC		Philips	Thomson-CSF

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\*\*      The Promise      \*\*  
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## Carrier Support for OSI

- Telecom Canada
- Teleglobe Canada
- CNCP
- A.T.&T.
- GTE
- MCI
- European, Asian PTT's

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\*\*      The Promise      \*\*  
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~~SECRET~~

## User Support for OSI

- European Economic Community
- Japan and Far East
- NATO
- NBS
- Financial (S.W.I.F.T II)
- Manufacturing (MAP, TOP)

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\*\*      The Promise  
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## Canadian Support for OSI

- National Library
- Financial Industry
- Universities: Ottawa, Carleton, Montreal, U.B.C.
- Common Carriers
- C.W.A.R.C.
- D.N.D.
- Manufacturing (GM, Ford, Chrysler)
- Food, Drug, & Transportation (EDI)

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# OSI

- is alive and well
- commercially available from major manufacturers and communications carriers

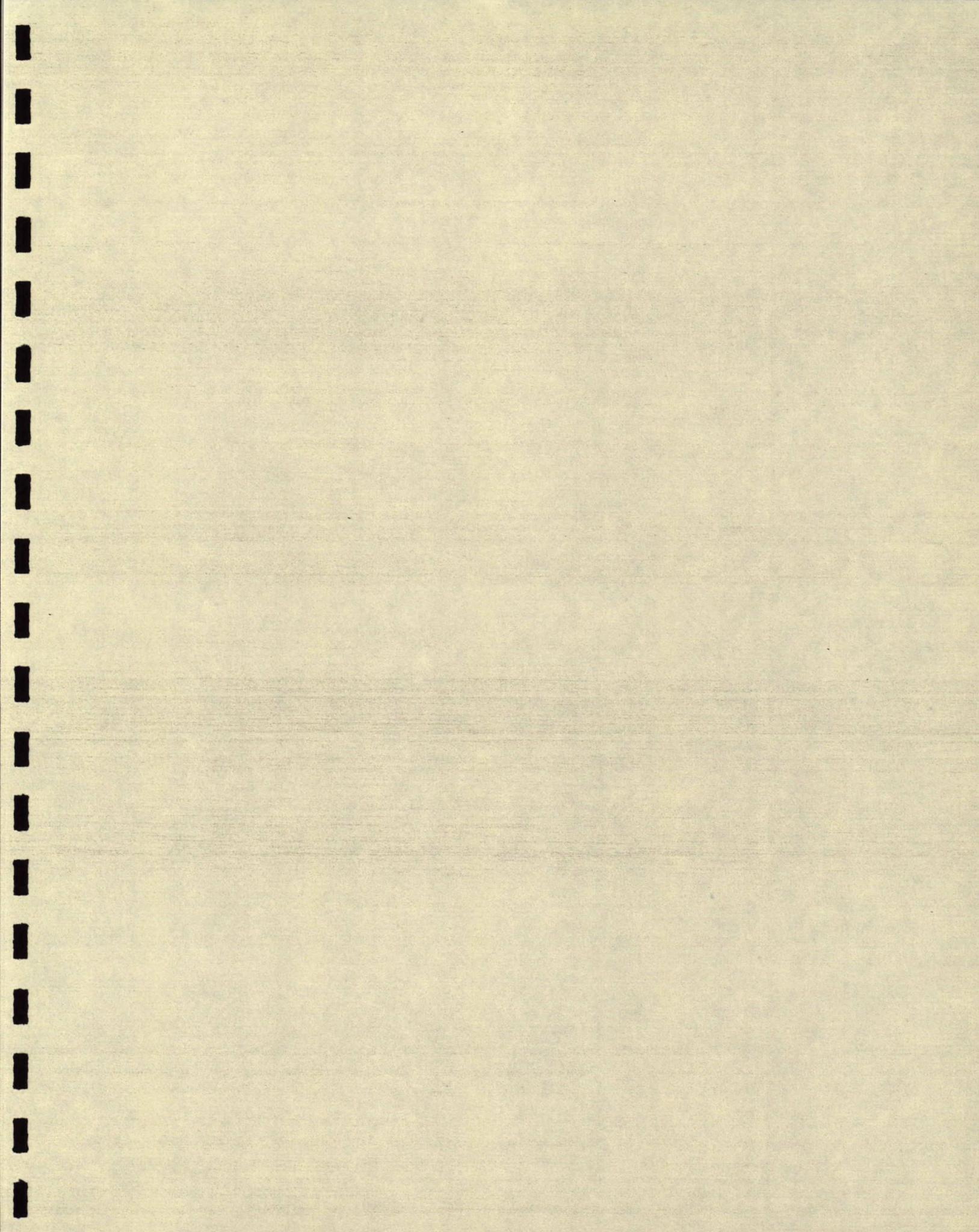
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\*\* The Promise \*\*  
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PC

# OSI

## PROMISES TO

- Simplify communications
- Integrate dissimilar systems
- Encourage increased usage
- Satisfy needs for the 1990's and beyond



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\*\* MIGRATING TO OSI \*\*  
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PSC

# MIGRATING TO OSI STANDARDS

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\*\* MIGRATING TO OSI \*\*  
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## TOPICS

- Drawbacks
- Benefits
- User Concerns
- Strategic Options
- Implementation Plan
- Tactical Concerns

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\*\* MIGRATING TO OSI  
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BSC

## DRAWBACKS

- large installed base of proprietary systems
  - e.g. SNA, DECNET
- OSI requires a large effort
  - . new architecture
  - . complexity (X.25 +)
- current deficiencies
  - . network management
  - . conformance verification
  - . many options and choices at all layers

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\*\* MIGRATING TO OSI \*\*  
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## BENEFITS

- compatibility regardless of equipment manufacturer or network type
- cost benefits for
  - development
  - implementation
  - support
  - training

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\*\* MIGRATING TO OSI \*\*  
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## BENEFITS (cont'd)

- easier procurement
- world-wide product market
- improved performance
- important basis for future application standardization and chip implementation

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\*\* MIGRATING TO OSI \*\*  
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PC

## USER CONCERNS

- Multi vendor compatibility
- Flexibility
- Growth
- Migration
- Investment

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\*\* MIGRATING TO OSI \*\*  
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## STRATEGIC OPTIONS

- Do nothing
- Manufacturer's proprietary solution
- Migration

RECOMMEND MIGRATION

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\*\* MIGRATING TO OSI \*\*  
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## IMPLEMENTATION OPTIONS

- IMMEDIATE
- DEFER
- GRADUAL (PHASED)

RECOMMEND GRADUAL

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\*\* MIGRATING TO OSI \*\*  
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## PHASED IMPLEMENTATION PLAN

- COEXISTENCE
- INTEGRATION
- MIGRATION

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\*\* MIGRATING TO OSI \*\*  
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## TACTICAL CONCERNS

- Vendor commitment
- Protocol implementation
- Conformance testing
- Active involvement

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\*\* MIGRATING TO OSI \*\*  
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Standards are a means

not an end

ASK VENDORS TO STATE THEIR POSITION

MIGR 10

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\*\* MIGRATING TO OSI \*\*  
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PSC

## ENSURE TRUE COMPATABILITY

- protocol vs model
- "modified" versions of protocols
- only some layers implemented

DETERMINE EXACT PROTOCOL SUPPORTED AT EACH LAYER

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\*\* MIGRATING TO OSI \*\*  
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PSL

## CONFORMANCE TESTING

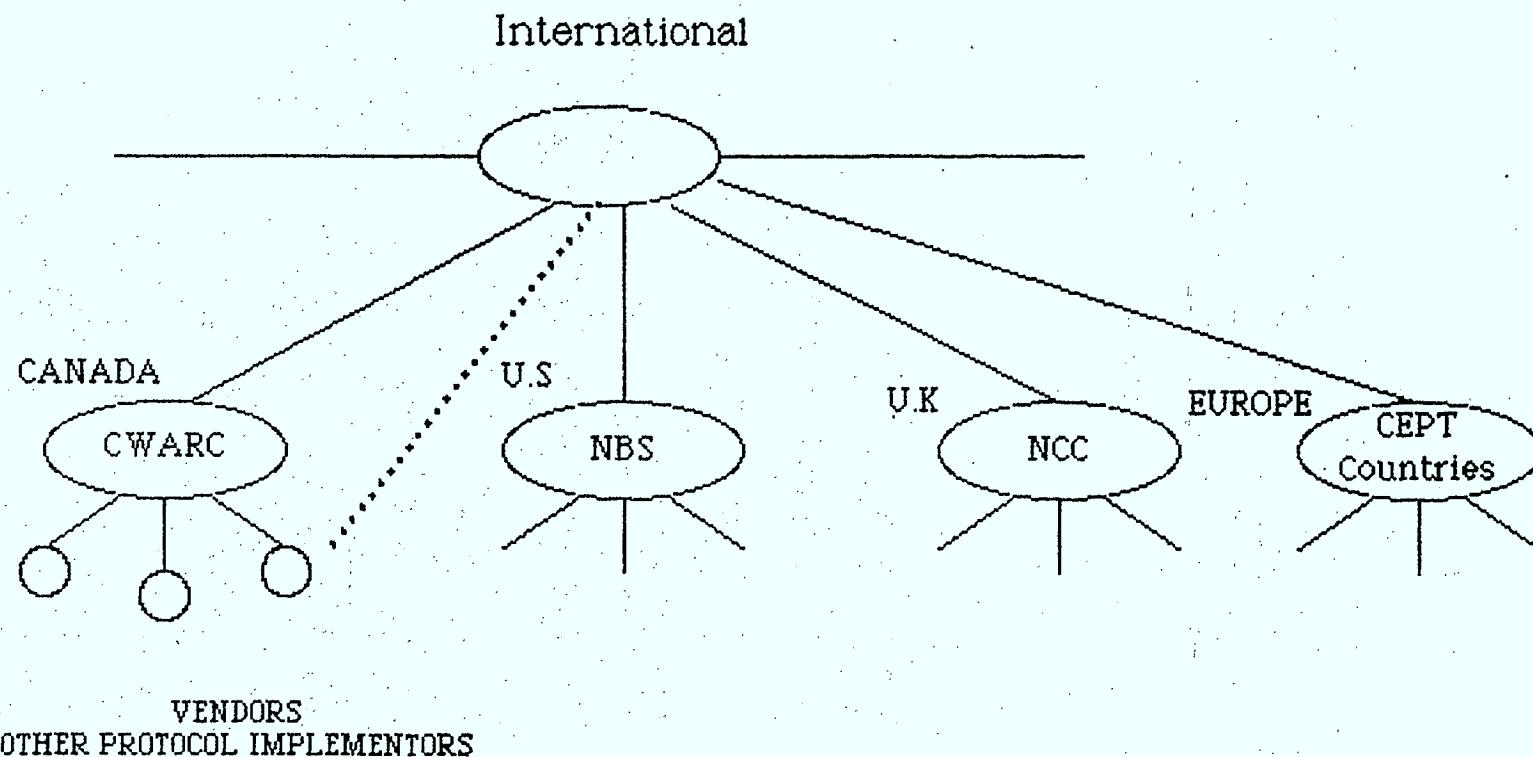
- standards specify conformance criteria
- uniformity ensured through standard test methods
- common test suites will be available

SUPPORT ESTABLISHMENT AND USE OF NATIONAL TEST CENTRES

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\*\* MIGRATING TO OSI \*\*  
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## International/National Test Centres



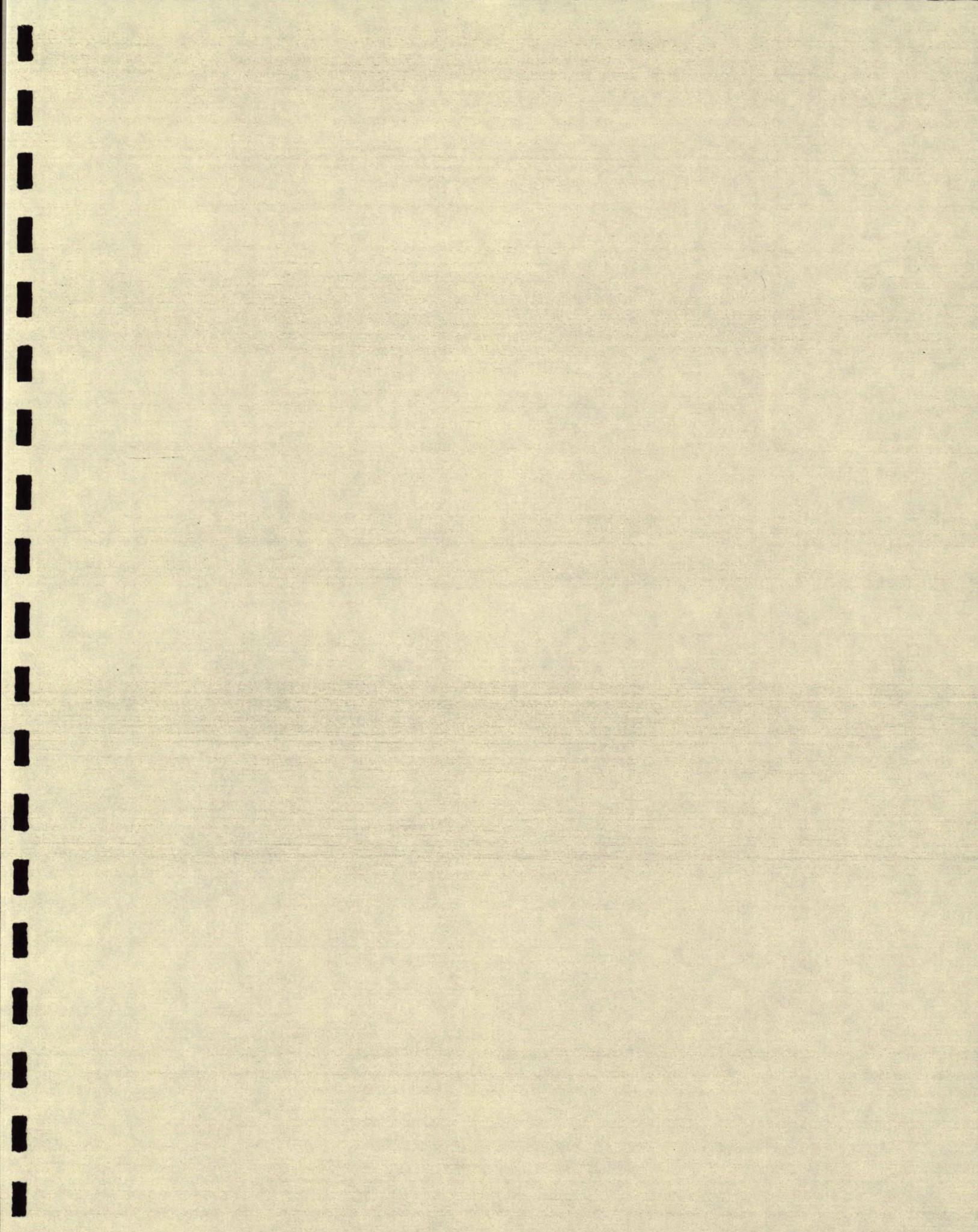
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\*\* MIGRATING TO OSI \*\*  
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## EVOLVING STANDARDS

- trend is towards more complex functionality
- significant progress has occurred
- needs are understood
- attention to standards is timely

RECOMMEND ACTIVE INVOLVEMENT



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\*\* STANDARDS \*\*  
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REC

STANDARDS  
ORGANIZATIONS  
AND  
PUBLICATIONS

STD 0

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\*\* STANDARDS \*\*  
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## PRINCIPAL INTERNATIONAL ORGANIZATIONS

ISO

International  
Organization  
for  
Standardization

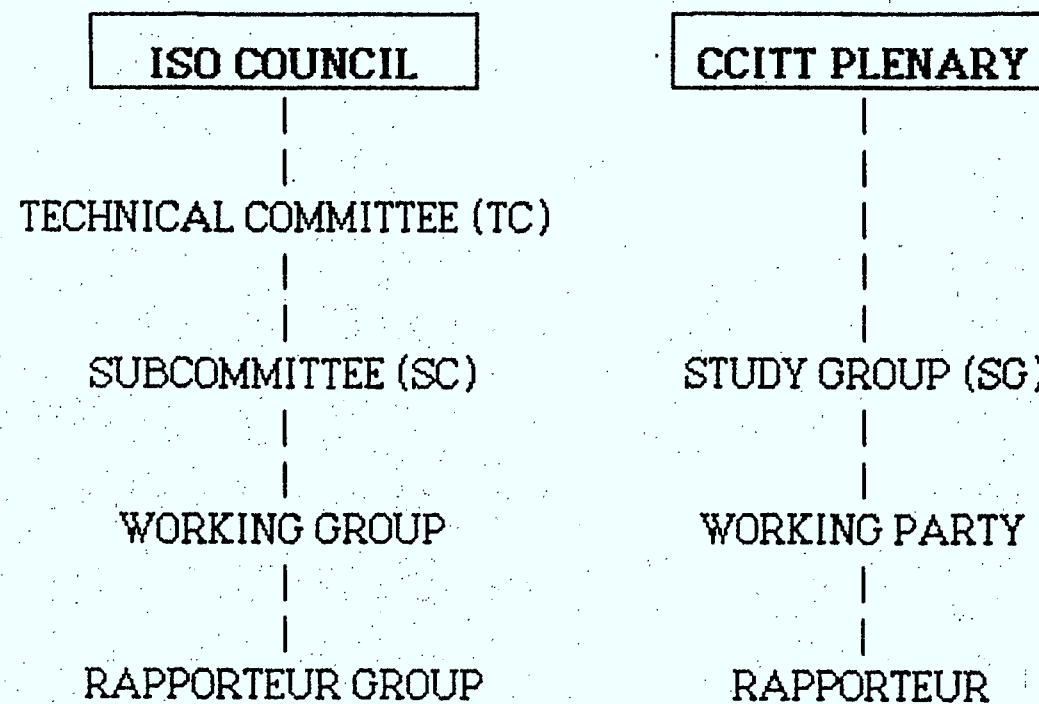
CCITT

International  
Telephone and Telegraph  
Consultative  
Committee

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\*\* STANDARDS \*\*  
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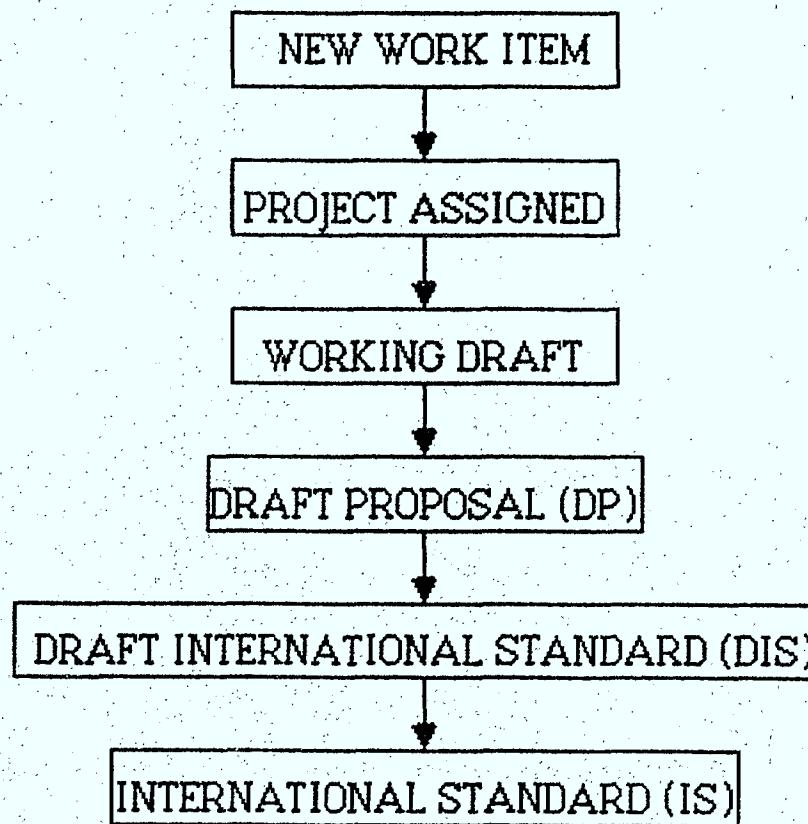
## ORGANIZATION HIERARCHY



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\*\* STANDARDS \*\*  
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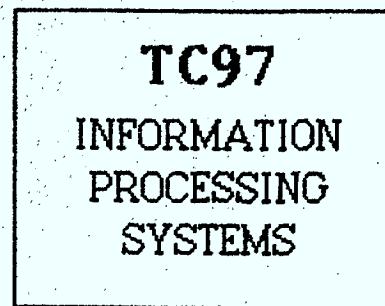
## GENERATING AN ISO STANDARD



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\*\* STANDARDS \*\*  
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# ISO TECHNICAL COMMITTEES



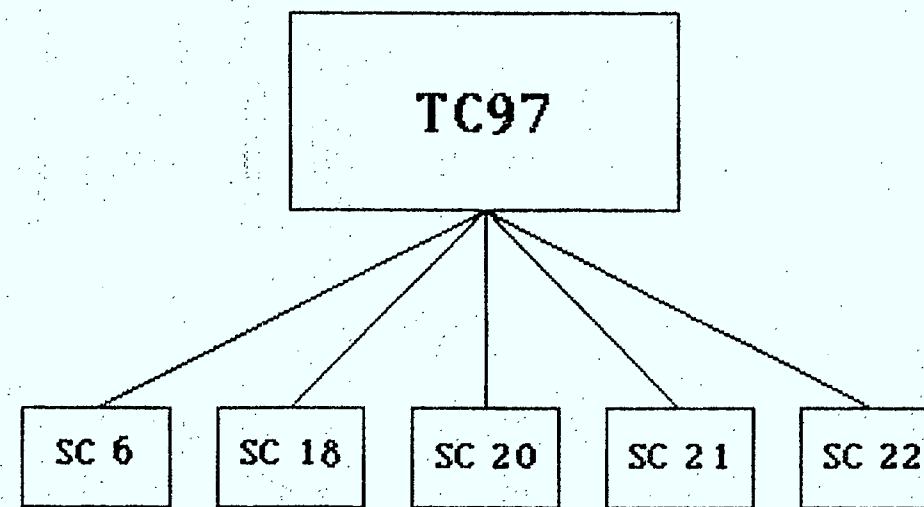
Standards for all aspects of computing

STD 4

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\*\* STANDARDS \*\*  
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PC

## ISO PRINCIPAL OSI COMMITTEES



- SC 6 - TELECOMMUNICATIONS AND INFORMATION EXCHANGE  
BETWEEN SYSTEMS
- SC 18 - TEXT AND OFFICE SYSTEMS
- SC 20 - DATA CRYPTOGRAPHIC TECHNIQUES
- SC 21 - OPEN SYSTEMS (HIGHER LAYERS)
- SC 22 - PROGRAMMING LANGUAGES

STD 5

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\*\* STANDARDS \*\*  
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# ISO SPECIAL INTEREST COMMITTEES

(OSI-RELATED)

TC 46

- BIBLIOGRAPHICS

TC68/SC5/WG4

- OSI APPLICATIONS IN BANKING

STD 5.1

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\*\* STANDARDS \*\*  
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*P/C*

## CCITT PRINCIPAL OSI-RELATED STUDY GROUPS

SG 1	-	TELEMATIC SERVICES
SG VII	-	DATA COMMUNICATIONS NETWORKS
SG VIII	-	TELEMATIC TERMINAL EQUIPMENT
SG X	-	CONFORMANCE
SG XVIII	-	ISDN

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\*\* STANDARDS \*\*  
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## NATIONAL STANDARDIZATION BODIES

<b>SCC</b>	-	CANADA
<b>ANSI</b>	-	USA
<b>BSI</b>	-	UK
<b>AFNOR</b>	-	FRANCE
<b>DIN</b>	-	GERMANY
<b>JISC</b>	-	JAPAN
<b>UNI</b>	-	ITALY

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\*\* STANDARDS \*\*  
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## BASIC REFERENCE MODEL ISO 7498/CCITT X.200

### SERVICE SPECIFICATIONS

PRESENTATION	DP 8822/CCITT X.409
SESSION	IS 8326/CCITT X.215
TRANSPORT	IS 8072/CCITT X.214
NETWORK	IS 8348/CCITT X.213 (X.25)
DATA LINK	DIS 8886

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\*\* STANDARDS \*\*  
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## PROTOCOL SPECIFICATIONS

PRESENTATION	DP 8323/CCITT X.409
SESSION	IS 8327/CCITT X.225
TRANSPORT	IS 8073/CCITT X.224
NETWORK	IS 8208/CCITT X.25
DATA LINK	ISO HDLC CCITT LAPB, LAPD
PHYSICAL	EIA RS-232-C/CCITT V.22 BIS EIA RS-366-C-(ACU)

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\*\* STANDARDS \*\*  
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PFC

## LOCAL AREA NETWORKS

	ISO	IEEE	LAYER
LOGICAL LINK CONTROL	DIS 8802/2	802.2	DATA LINK
CSMA/CD	DIS 8802/3	802.3	PHYSICAL/MAC
TOKEN BUS	DIS 8802/4	802.4	PHYSICAL/MAC
TOKEN RING	DIS 8802/5	802.5	PHYSICAL/MAC
SLOTTED RING	DP 8802/7	-	PHYSICAL/MAC

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\*\* STANDARDS \*\*  
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## APPLICATION LAYER

File Transfer, Access and Management	DP 8571
Job Transfer and Management	DP 8831, 8832
Common Application Service Elements	DP 8649, 8650
Virtual Terminal:	
Basic Class Service	DP 9040/1
Basic Class Protocol	DP 9041/1
EDI	ANSI X.12

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\*\* STANDARDS \*\*  
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## STANDARDS SPANNING LAYERS

### Message Handling System

P1 CCITT X.401 / X.411

P2 CCITT X.420

P3 CCITT X.401 / X.411

X.250 Formal description techniques

T.60 Series Telematic services: Teletex  
Facsimile  
Mixed Mode

T.100 Series Videotex

I.100 Series ISDN

MAP Factory Automation

TOP Office Automation



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## OSI : AN OVERVIEW

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