

STANDARDISATION FOR OPEN SYSTEMS

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# Telecommunication Standards

– The Role Today

## Standards for Open Systems

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### Why Are OS Standards Needed?

- Computer engineering needs
- Computing application needs
- Social needs
- Industry needs

## What Is 'A Standard'?

- De Facto 2780 . . .
  - Proprietary SNA, DEC net . . .
  - Company British Steel . . .
  - Industry SITA . . .
  - Government
  - 
  -
- Privately developed and maintained
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## What Is Needed From OS Standards?

- Widely accepted
  - Technically sound and minimum constraints
  - Stable and well defined
  - Timely evolution
  - Interconnection and inter-working
  - An enabling technology
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## What Are 'Public Standards'?

Public standards = Standards from  
accredited standards  
organisation

Organisations provide:

- Accepted mechanisms
    - Legally
    - Interested parties
  - Clear source of information
  - Safeguards
    - Representation
    - Procedures
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## What Is 'A Standard'?

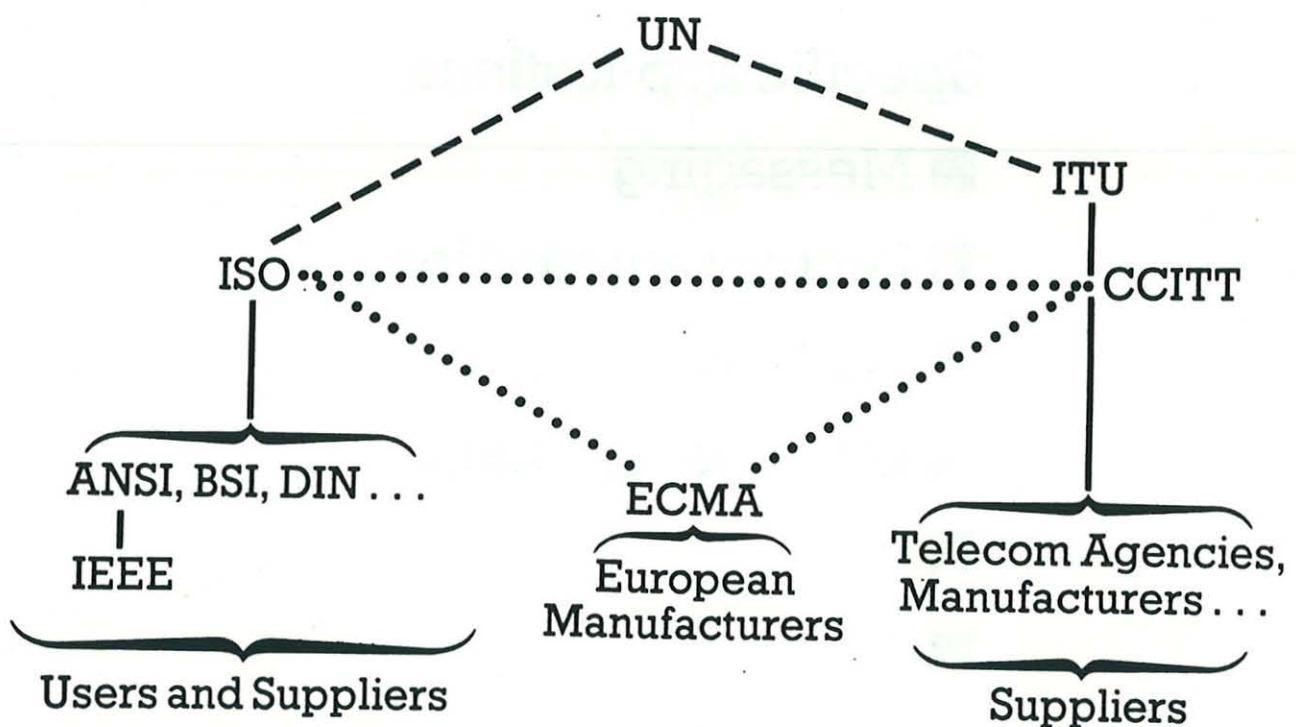
- OS standards
  - International public standards

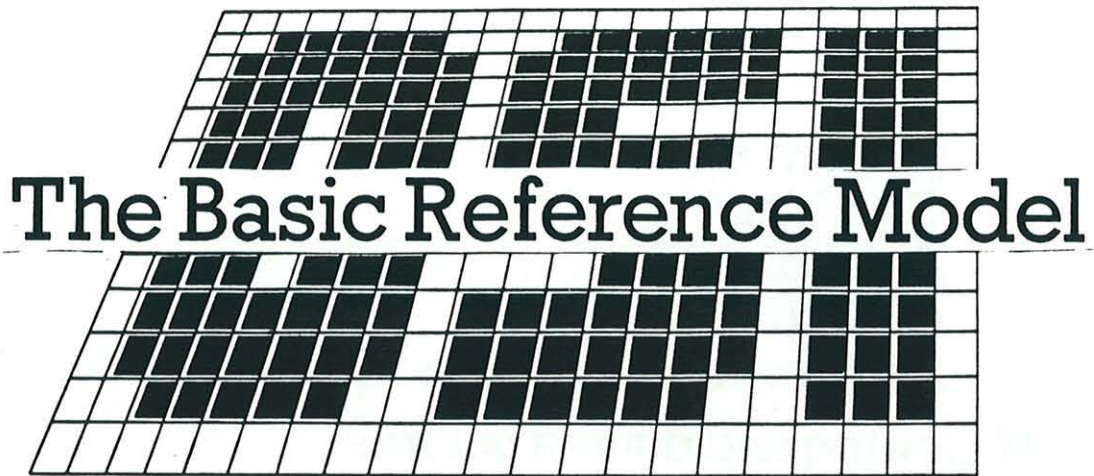
Publicly developed and maintained

## Core standards

- Open system standards – Basic services
  - Open systems interconnection
  - Basic inter-working
  - Operations on information
  - Graphics
  - Database
  - OSCR
  - Interworking about operations on information
- Coding and data structures
- Encryption
- Languages

## Standards Organisations



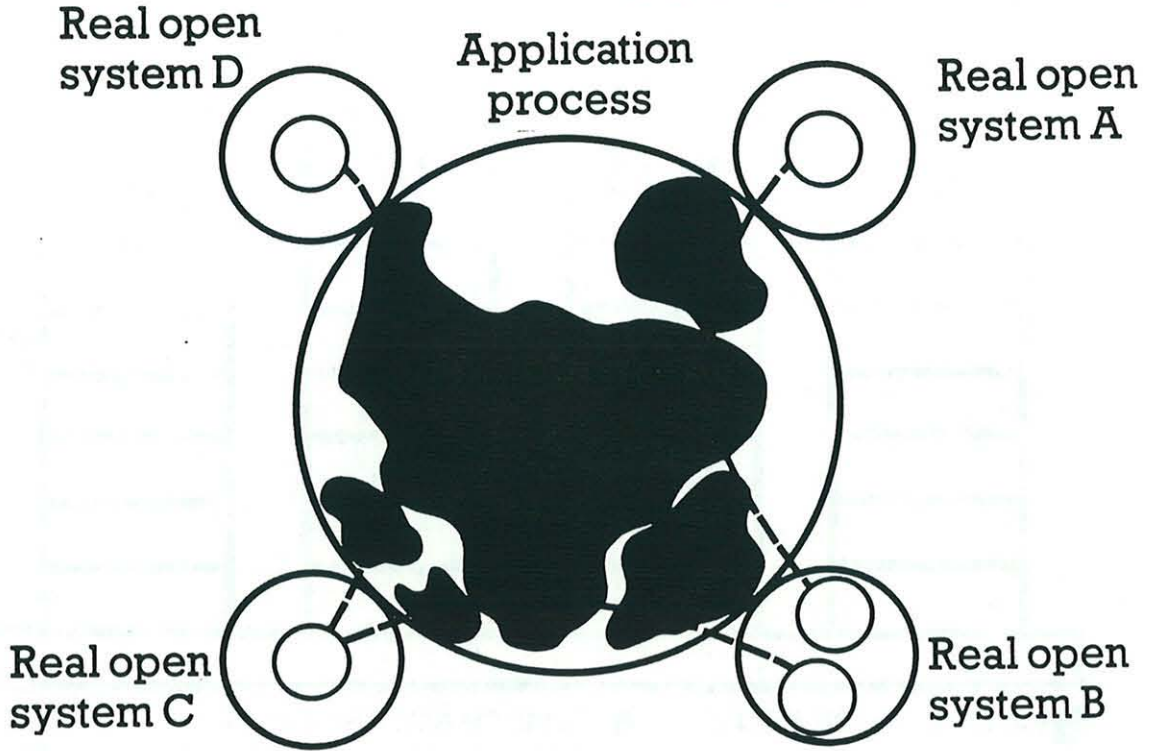


## What Standards?

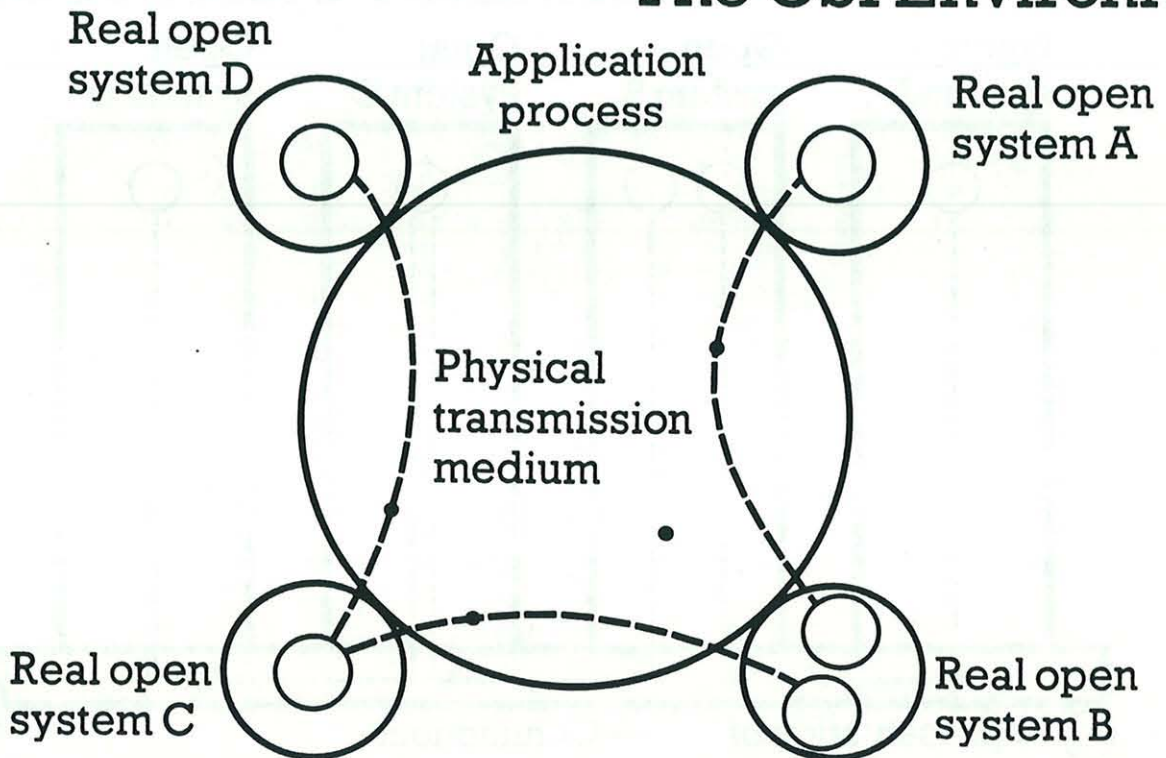
### Specific applications

- Messaging
- Factory automation
- Banking
- Office automation
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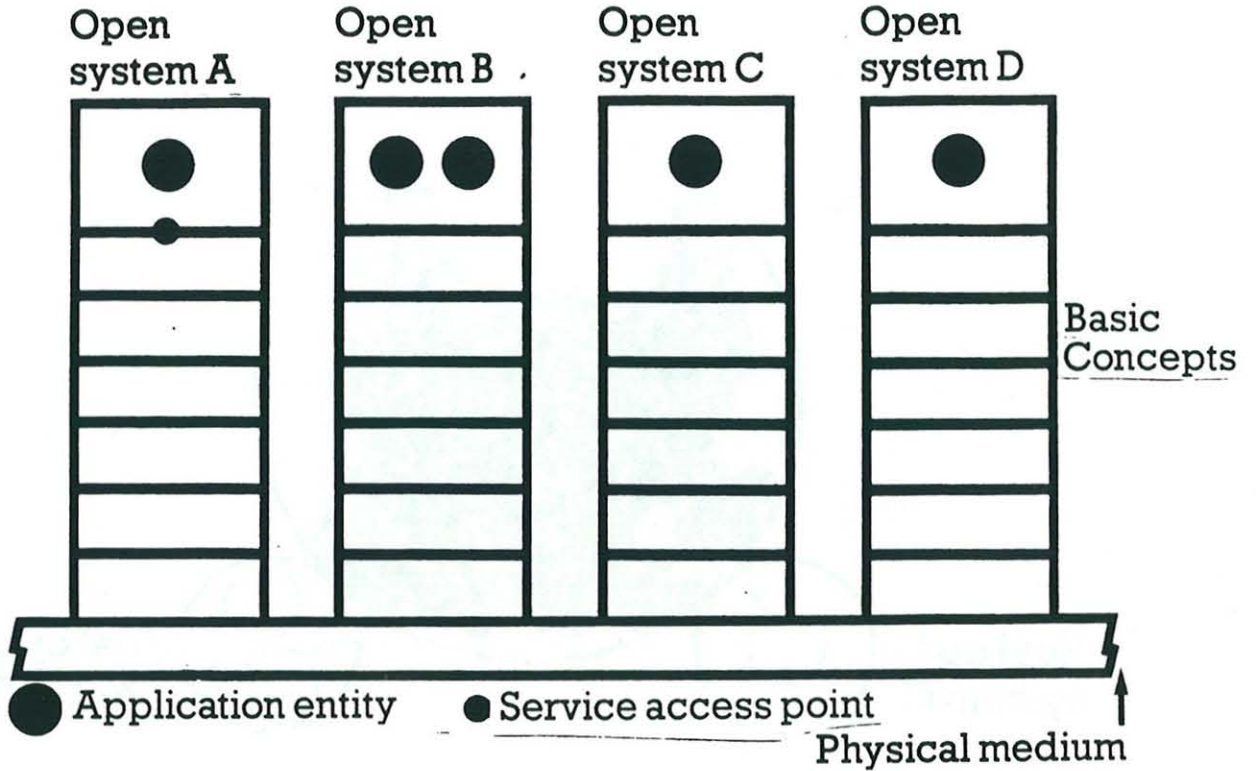
# The OSI Environment



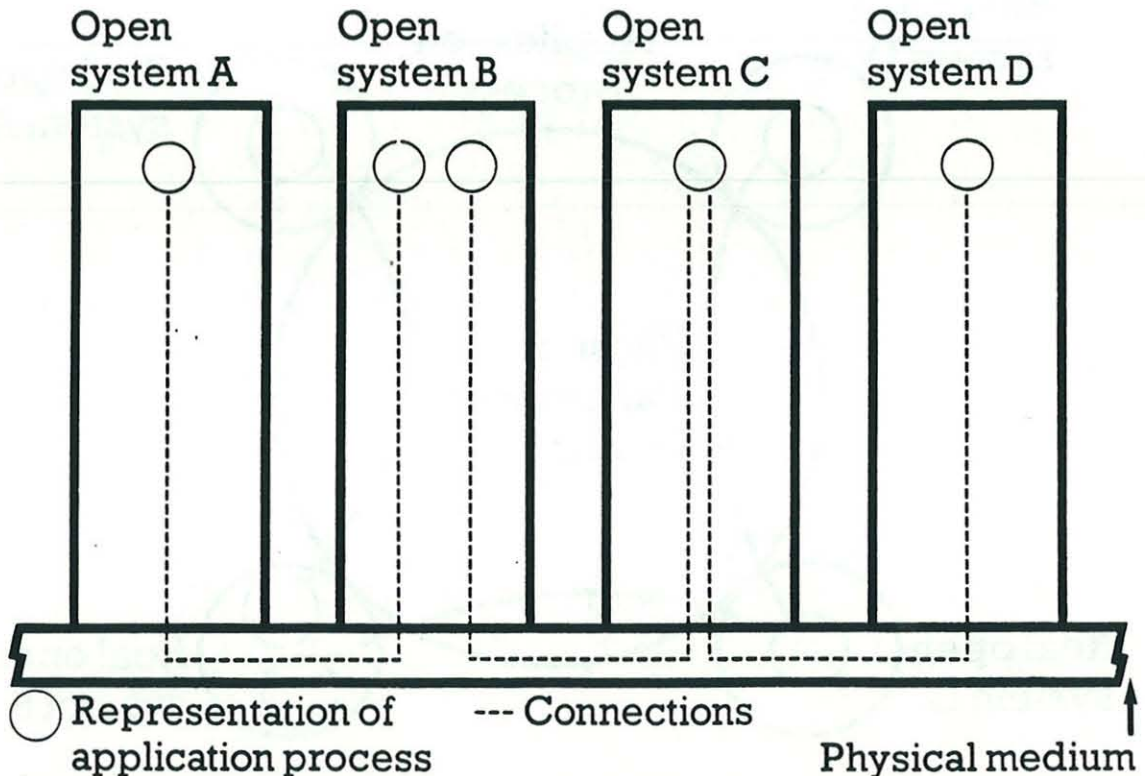
# The OSI Environment



# OSI Basic Reference Model



# OSI Basic Reference Model

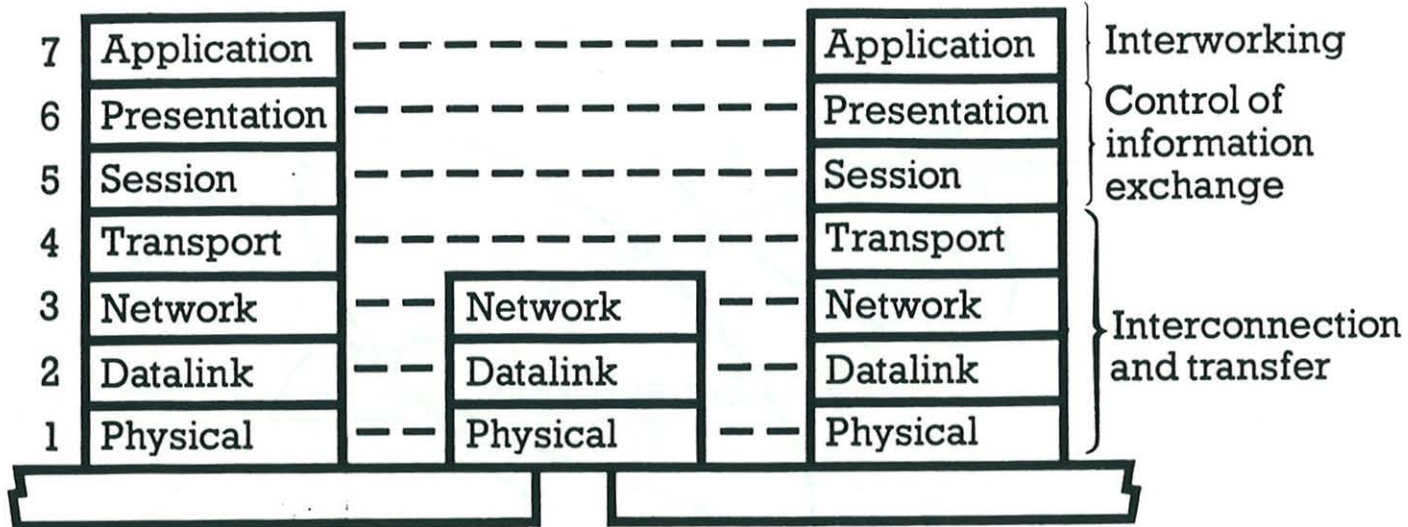




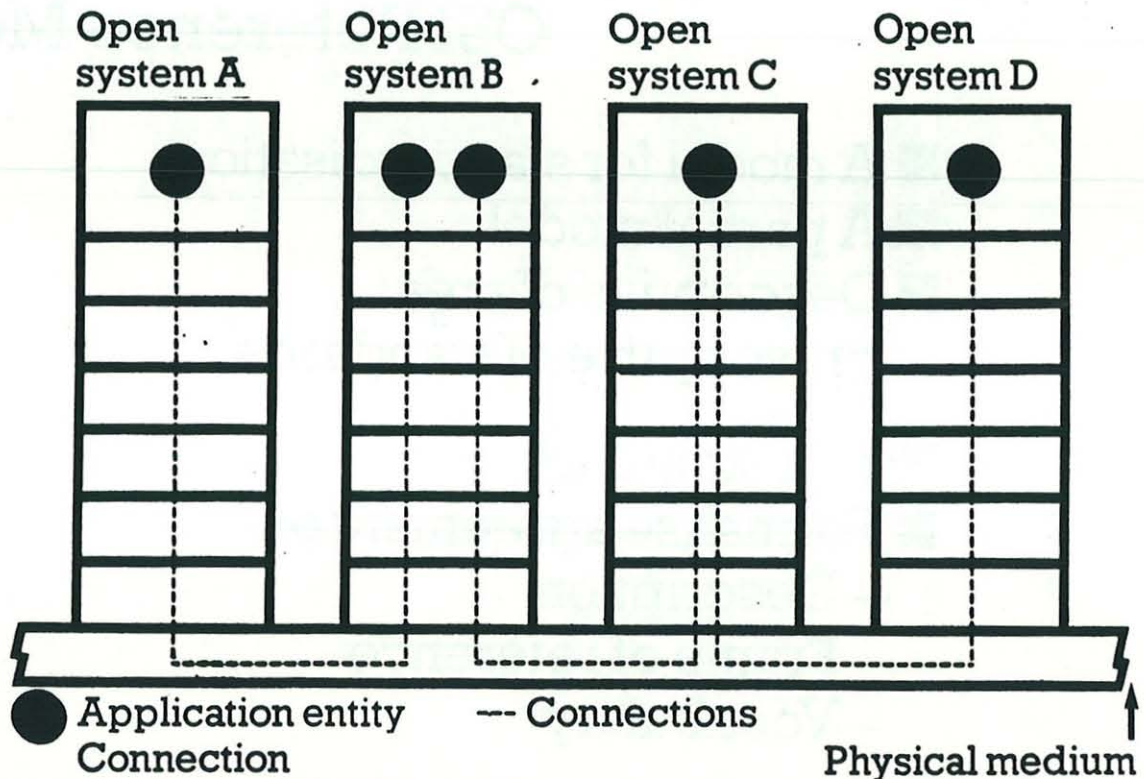


# OSI Basic Reference Model

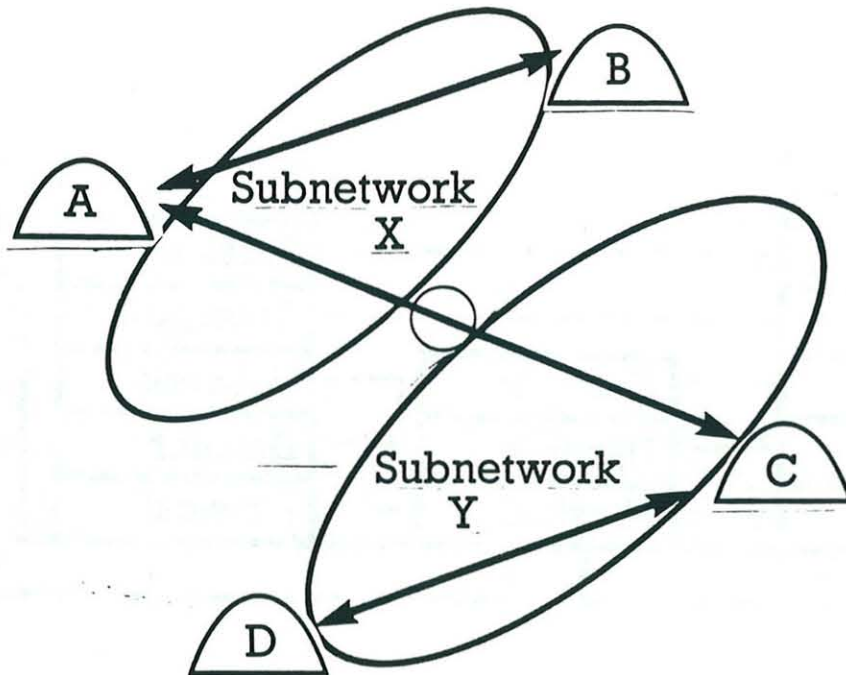
Allocation of functions



# OSI Basic Reference Model



# The Network Service – The Internetworking Problem



## Characteristics of the OSI Reference Models

- A model for standardisation
- A partial model
- Descriptive of area/  
prescriptive of standards

Why a standard?

- Formalise agreement on
  - Description
  - Frame of reference
  - Vocabulary



# The Function of the Transport Layer

Service requirements:

- Throughput
- Transit delay
- Error rate
- Set up delay
- Resilience
- Security
- Priority
- Cost



# The Function of the Transport Layer Responsibility –

Application	'Ignorance is bliss'
Presentation Session	'We ask and it shall be given'
Transport	'I am in charge of providing the service asked for – The Buck Stops Here'
Network Link Physical	'We do the best we can'



## Interconnection Standards Status

### Transport

- CX-Mode service and protocol IS 8072/3
- $\overline{\text{CX}}$ -Mode service and protocol IS 8072/DAD 1
- Conversion protocols:  $\overline{\text{CX}}$ -NS to CX-TS  
IS 8073/PAD 2
- Network connect management IS 8073/PAD 1



## Interconnection Standards Status

### Network

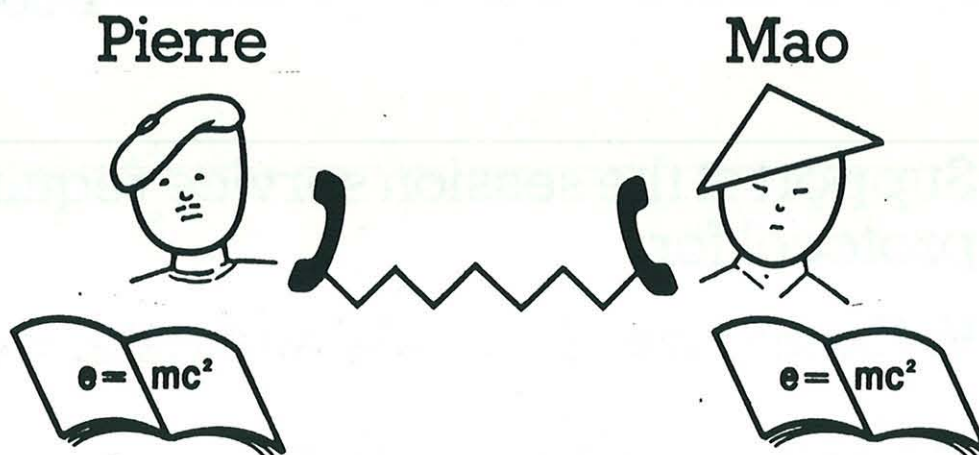
- Service: CX-Mode } IS 8348  
 $\overline{\text{CX}}$ -Mode }
- Addressing IS 8348/DAD 1
- Provision of CX-Mode NS: Over X.25 IS 8208  
Over LANs DP 8880/1  
DP 8878
- Provision of  $\overline{\text{CX}}$ -Mode NS DIS 8473
- Access to packet switched networks (X.25) IS 8208
- LAN standards (from IEEE) DIS 8802/2-3  
DP 8802/4-6

## Information Exchange – Common Procedures

The session service provides for

- Establishment of connections with negotiation of facilities
- Control of turn
- Control of synchronization and resynchronization
- Management of activities
- Orderly closedown

## Control of Information Exchange



- Common meaning (abstract syntax)
- Common language(s) (encoding, transfer syntax)
- Common procedures (message protocol)

Common meaning and common languages

Support of the presentation service requires

- The definition and registration of abstract syntaxes and encodings
- Presentation protocol using registered definitions

## Information Exchange – Common Procedures

Support at the session service requires protocol for

- Exchange of 'signals' and data, with
- Resolution of collisions
- Resynchronization to a known state



## Information Exchange

Common meaning and common languages

- Presentation layer provides no communications procedures



## Information Exchange

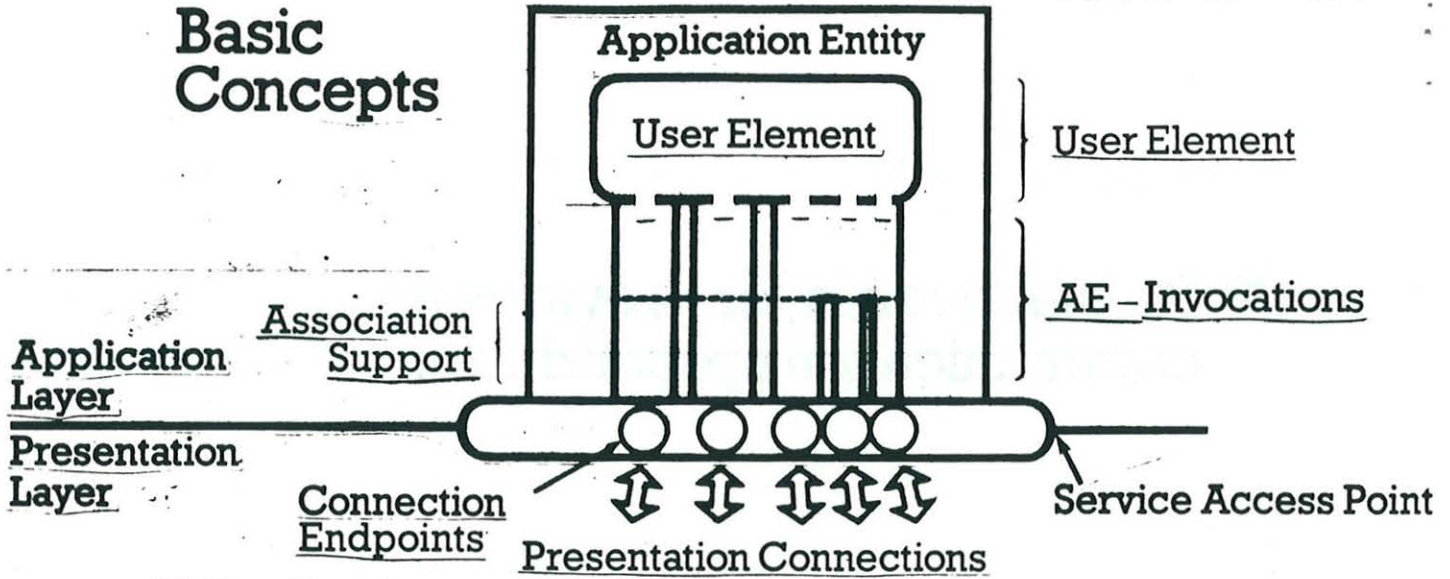
Common meaning and common languages

The presentation service provides for

- Agreement on the structure of data to be exchanged
  - Exchange of structured data
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# Inter-working – The Application Layer

## Basic Concepts



- Application service element  
Conceptual functional module within an AE – Invocation

# Information Exchange – Standard Status

## Session

- CX-Mode service and protocol IS 8326/7

## Presentation

- CX-Mode service and protocol (2nd) DP 8822/3

- Abstract syntax notation 1 (ANS.1)

- Definition DIS 8824
- Encoding DIS 8825



## Inter-working – The Application Layer

Scope of services/protocols  
Not (necessarily) pairwise

- Managing
- Jobs
- Banking
- 
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## Inter-working – The Application Layer

Nature of services/protocols

- Relate to meaning of exchanges
  - At level of information processing
  - At level of application
- Relate to 'service' provided by remote system
- May be combined



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## Inter-working Standards

### Specific application service elements (SASE)

- File transfer access and management  
(2nd) DP 8571
  - Job transfer & manipulation  
(2nd) DP 8831/2
  - Basic class virtual terminals DP 9040/1
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## Inter-working Standards

### Common application service elements (CASE)

- Association control  
(2nd) DP 8649/50 Part 2
  - Commitment, concurrency  
& recovery DIS 8649/50 Part 3
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# Progress on OSI Standards – A Summary

	1984	1985	1986	1987
Basic reference model				
Naming & addressing				
Addendum		DP	DIS	IS
Security addendum		DP	DIS	IS
File transfer		DP2	DIS	IS
Job transfer	DP1	DP2	DIS	IS
Commitment & recovery	DP	DIS		
Basic class terminals		DP1	DIS	IS
Directory services			DP	DIS
Presentation	DP	DP2	DIS	IS
Session	DIS	IS		
Transport	IS			
Network service		IS		
Network protocols		IS		
X.25				
LANS		DP	DIS	
Network addressing	DP	DIS	IS	



## Inter-working Standards

### Management

- Directory services      DP Q3/1986
- Information services    DP Q3/1986



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# Standards For Open Systems

## A Framework for IT evolution

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## DISCUSSION

### Lecture 1:

Mr. Wood's talk provoked a number of questions about the standardisation process.

Dr. Cohen asked what does 'publicly developed' mean when applied to standards.

Mr. Wood explained that these are voluntary standards.

Professor Randell queried what was meant by 'maintained ... safeguarded and evolved'.

Mr. Wood explained that this meant it is "both safeguarded and evolved". There can be rapid responses to errors found in the field. It also allows a timely evolution. There are problems in finding mechanisms to handle this.

Dr. Cohen stated that he had a problem with the word 'accepted' - should they be 'enforced standards'? Mr Wood replied that the standards are accepted in that people have voted to accept it. The standards have no legal status unless it is specified in a contract. The standards are simply a means of getting acceptance.

Mr. Wood, in responding to a request to explain the differences between the CCITT voting and advice representation, stated that the final voting rights are held by governments. However, this is changing in Great Britain and it is different in the United States. The vote must be unanimous and it can lead to ambiguities.

The discussion then moved to the subject of reference models, with Mr. Wood pointing out that there is only one Reference Model at the moment for Open Systems Interconnection. It is a picture of the current standardisation. It is a level of understanding.

Professor Randell stated that there seems to be much more stress on protocols at a given layer rather than an abstract service at a layer. Mr. Wood denied this, stating that a great deal of effort went into the service definition. The service definition was crucial to the development of the Model.

Questioned about the difference between a Service Access point and an Address Mr. Wood explained that the address is the Address of a Service Access Point and stated that these can be in a one to many relationship.

## DISCUSSION

### Lecture 2:

Mr. Wood's second talk was followed by a lively debate on the importance of standardisation to education. Professor Milner remarked that too often in the past computer science has been regarded as knowledge of ISO standards. Mr. Wood agreed that in future computer scientists should contribute more to the standardisation process. They should evaluate standards already set and propose further developments. There is also pressure for standards, and input from the academic community is essential. Dr. Cerf said that as a 'consumer' he felt that students should be taught about standards. Dr. Scoins remarked that to do this at undergraduate level is an impossible task and that employers must be responsible for educating their intake about such matters. In response to Dr. Cerf's suggestion that undergraduates be taught X25, Dr. Scoins said that the subject is too complicated. Professor Milner countered Dr. Cerf's remark that X25 is very important by saying that some subjects are too complicated, despite their importance. Professor Tanenbaum suggested that teaching from lengthy standardisation documents is not very easy. Mr. Wood felt, nevertheless, that students should be aware of the underlying principles of standardisation. Dr. Larcombe observed that it is frequently the case that lecturers are unaware of the existence of standards relating to the subjects they teach.