

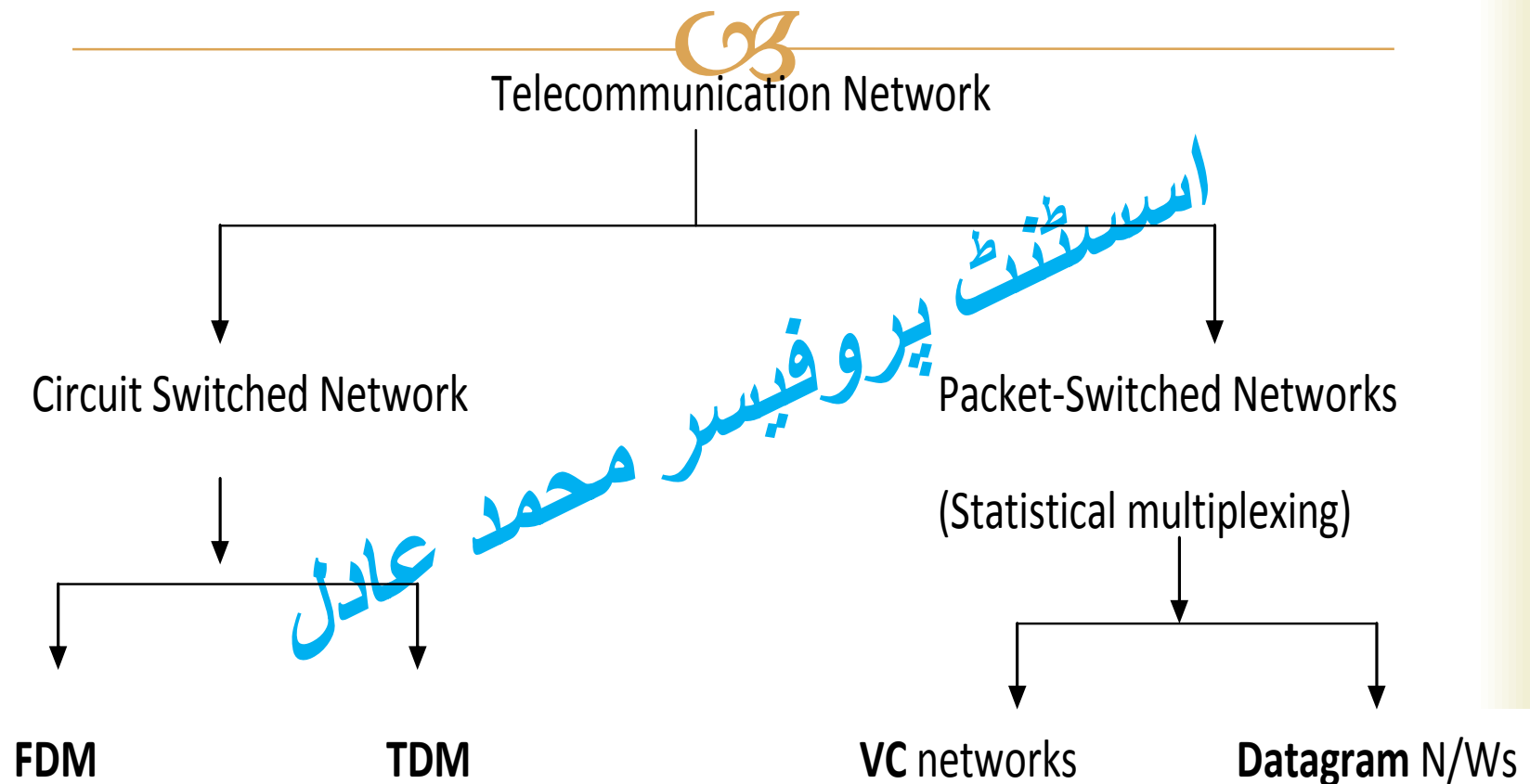
Voice over IP

Lecture# 7

VIRTUAL CIRCUIT NETWORK

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Telecommunication Network



VIRTUAL CIRCUIT NETWORK



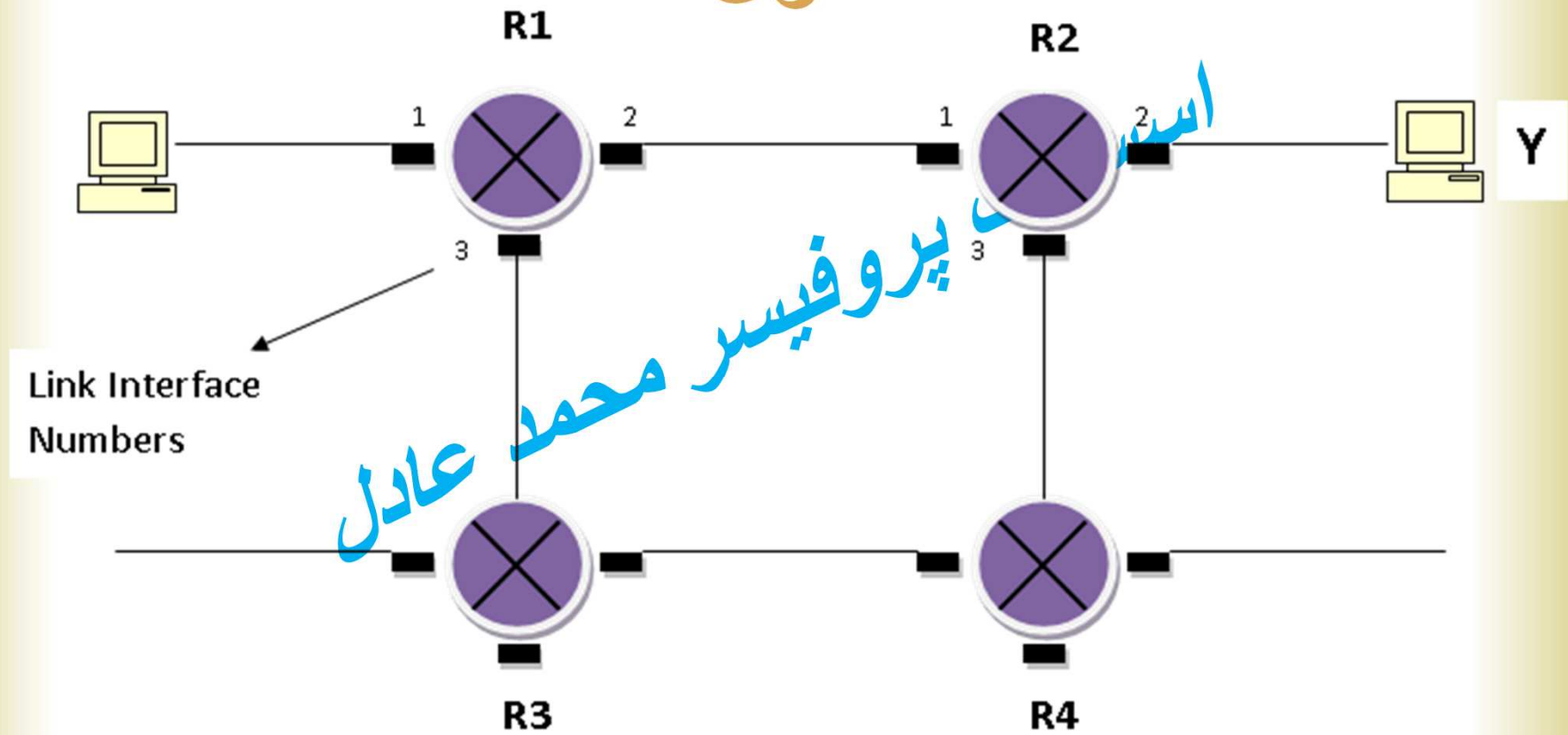
- ❧ A VC can be thought of a virtual connection between a sending and receiving host.
- ❧ A virtual circuit Identifier (VC-ID) will be assigned to a VC, when a VC is first established.
- ❧ Any packet that is the part of the VC has VC ID in its header
- ❧ Each packet switch has a table that Maps VC ID to outbound links.
- ❧ When a packet arrives to a packet switch, its VC ID is examined, the table is indexed and the packet is forwarded to the destination outbound link.

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- ❧ A VC consists of a path i.e. a series of links and routers between the source and destination hosts.
- ❧ A VC also consists the entries in the forwarding table in each router along the path.
- ❧ A VC's packet will carry a VC # in its header.
- ❧ As, a virtual circuit may have different VC# on each link, so each intervening router must replace the VC# of each traversing packet with a new one.
- ❧ The new VC# is obtained from the forwarding table.

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- ❧ Suppose that Host X requests that the network established a VC between itself and Host Y.
- ❧ Let the network chooses the path X-R1-R2-Y and assigns VC# 11, 21, 31 to the 3-links in this path for this VC.
- ❧ This means that when a packet leaves X, the value in the VC number field in the packet header is **11**, when it leaves **R1**, the value is **21** and when it leaves **R2**, the value is **31**.
- ❧ The router determines the replacement VC# using router's forwarding table that includes VC# translation e.g. the forwarding table in R1 might look something like this.

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INCOMIN INTERFACE	INCOMEING VC#	OUTGOING INTERFACE	OUTGOING VC#
1	11	2	21
2	60	1	28
3	7	2	17
1	80	3	60
2	97	3	87
...

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- ❧ When a new VC is established across a router, an entry is added to the forwarding table.
- ❧ Similarly , when a VC terminates, the corresponding entries in each table along its path are removed.
- ❧ There are some reasons that a packet doesn't just keep the same VC number on each of the links along its route,
 1. Replacing the number from link to link reduces the length of the VC field in the packet header.
 2. Using different VC# makes a VC setup very simplified. Specially, with multiple VC#s, at each link in the path can choose a VC# independently of the VC# chosen at other links along the path.
 3. In case of a common VC# the routers would have to exchange and process a considerable number of messages to agree on a common VC#, e.g. one that is not used by any other existing VC at the router for a connection.

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CONNECTION STATE INFORMATION

- ❧ In a VC setup, the network's router must maintain connection state information for the ongoing connections.
- ❧ Each time a new connection is established across a router, a new connection entry must be added to the router's forwarding table, and each time a connection is released, an entry must be removed from the table.
- ❧ Even if there is no VC-number translation, it is still necessary to maintain connection state information that associates VC number with output interface numbers.

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PHASE IN VC

A) VC SETUP:

- ✧ In this phase, the sending transport layer connects the network layer, specifies the receiver's address and waits for the network to setup the VC
- ✧ The network layer determines the path between sender and receiver means the series of links and routers.
- ✧ The network layer also determines the VC number for each link along the path.
- ✧ Network layer also adds an entry in the forwarding table in each router along the path.
- ✧ In VC setup, the network layer may also reserve the resources, for example bandwidth, along the path of VC

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PHASE IN VC

B) DATA TRANSFER:

- ☞ After the VC has been established, packets now can flow along the VC.

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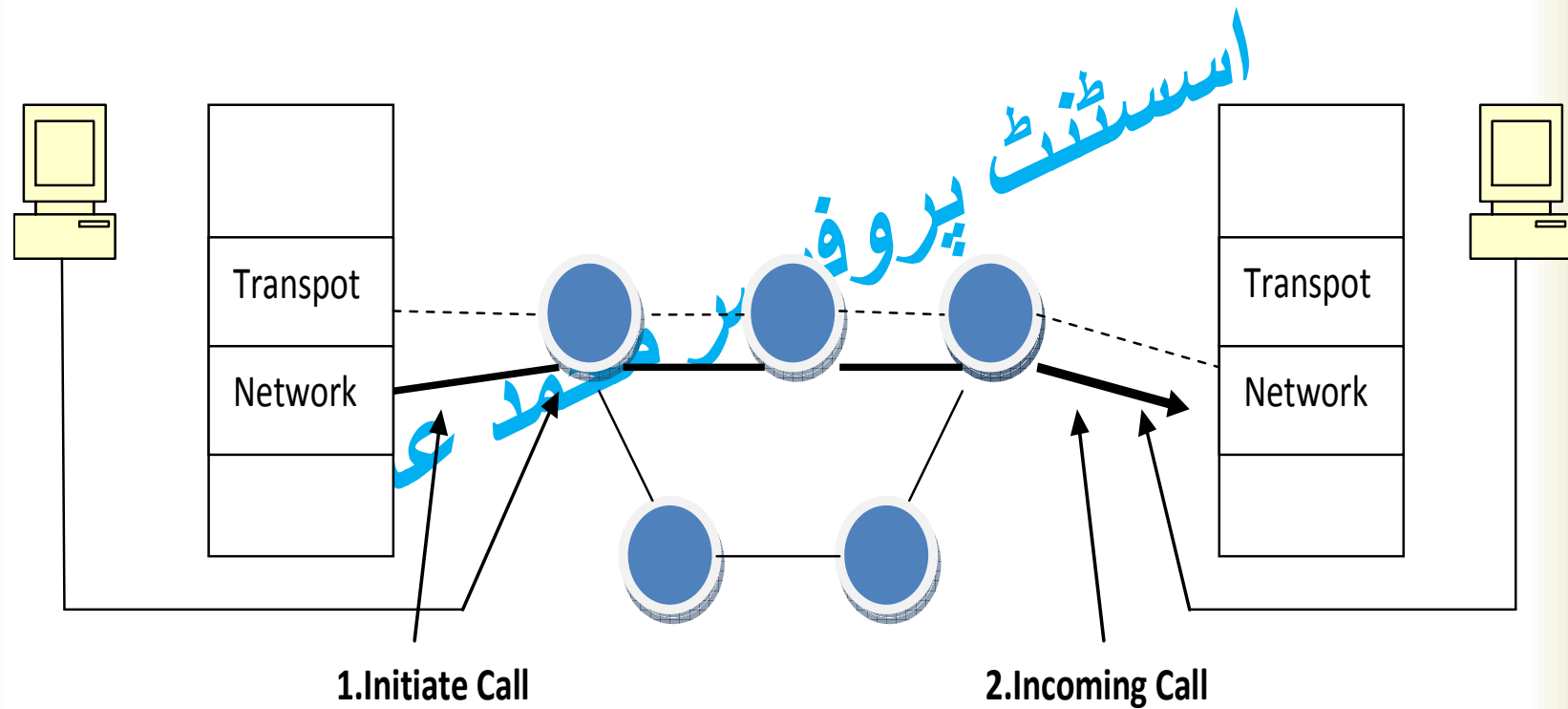


PHASE IN VC

C) VC TEARDOWN:

- ❧ When the sender or receiver informs the network layer to terminate the VC, the VC teardown will be initiated.
- ❧ The network layer will then typically inform the end system on the other side of the network of the termination and update the forwarding tables in each router on the path that the VC no longer exists.
- ❧ The messages that the end systems send into the network to initiate or terminate a VC, and the messages passed between the routers to setup the VC i.e. to modify the connection state in router tables are known as “**Signaling Messages**”.
- ❧ The protocols used to exchange these messages are called “**Signaling Protocols**”.

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