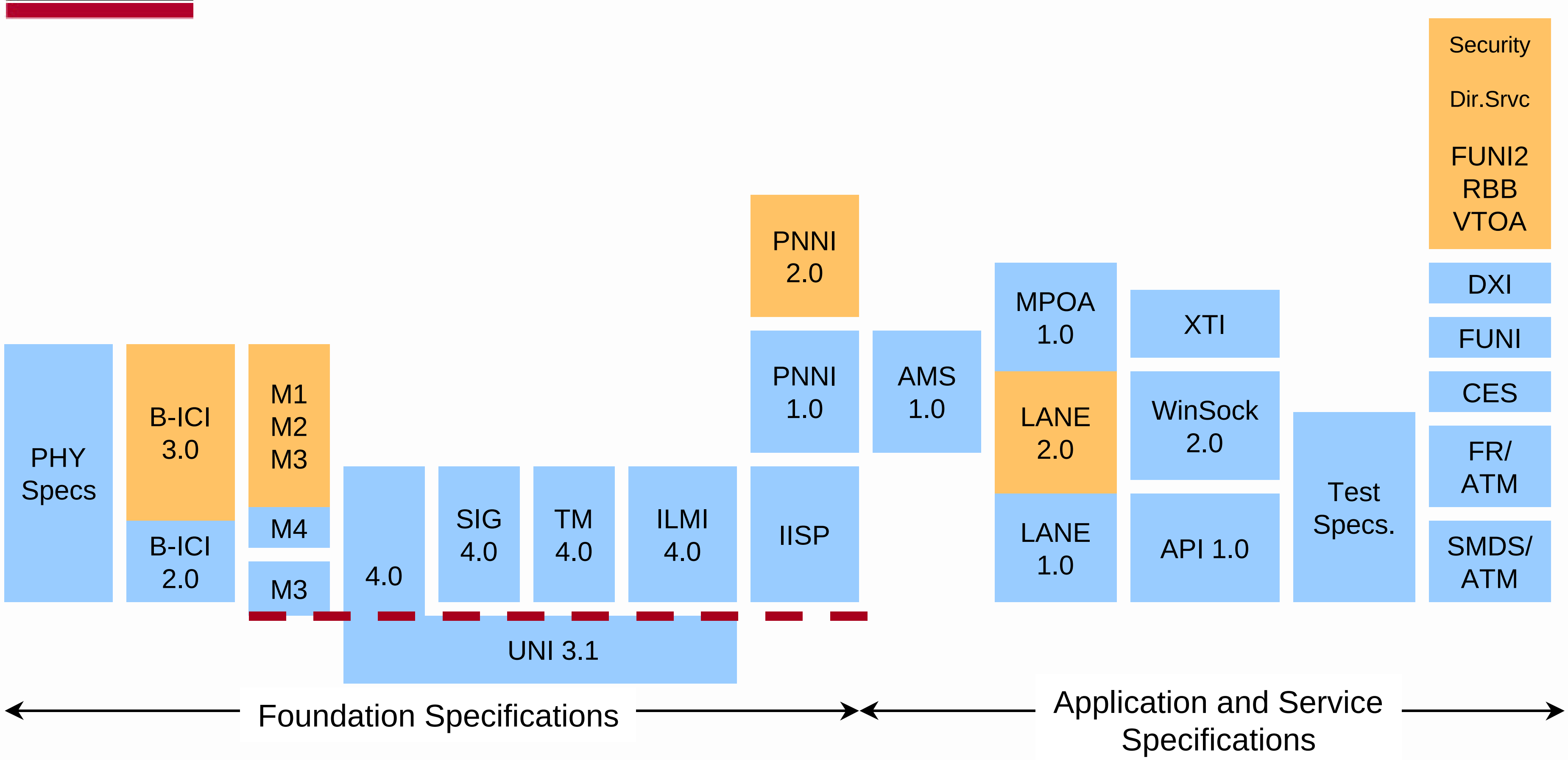
FORE
SYSTEMS

Some ATM Jargon

Part 1: Logical Interfaces

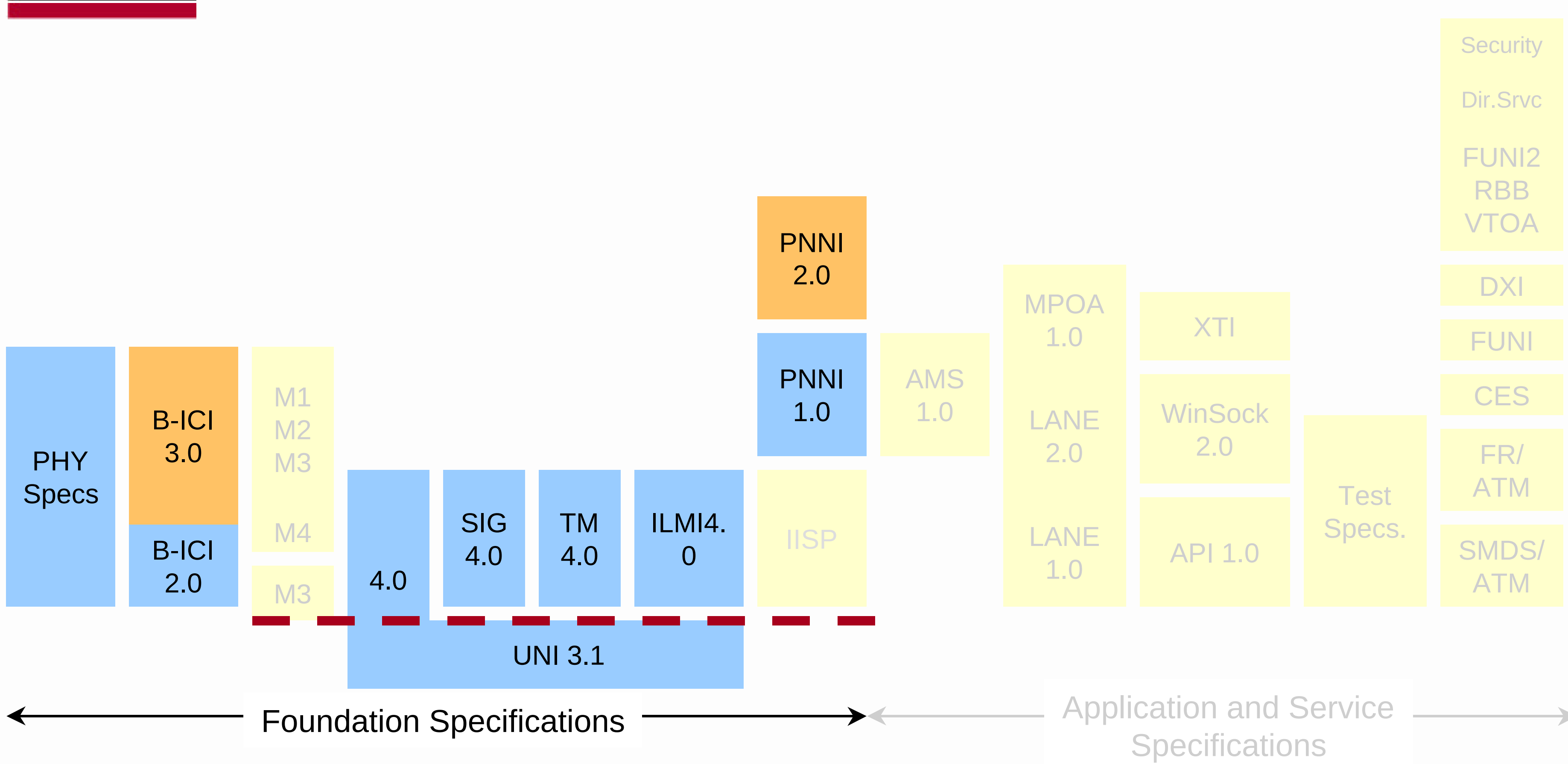
V1.0: Geoff Bennett

Anchorage Accord Spec. Relationships



This is a summary of the ATM Forum migration model. As you can see, it looks pretty complex at first glance, but it's not too bad when you delve a bit deeper.

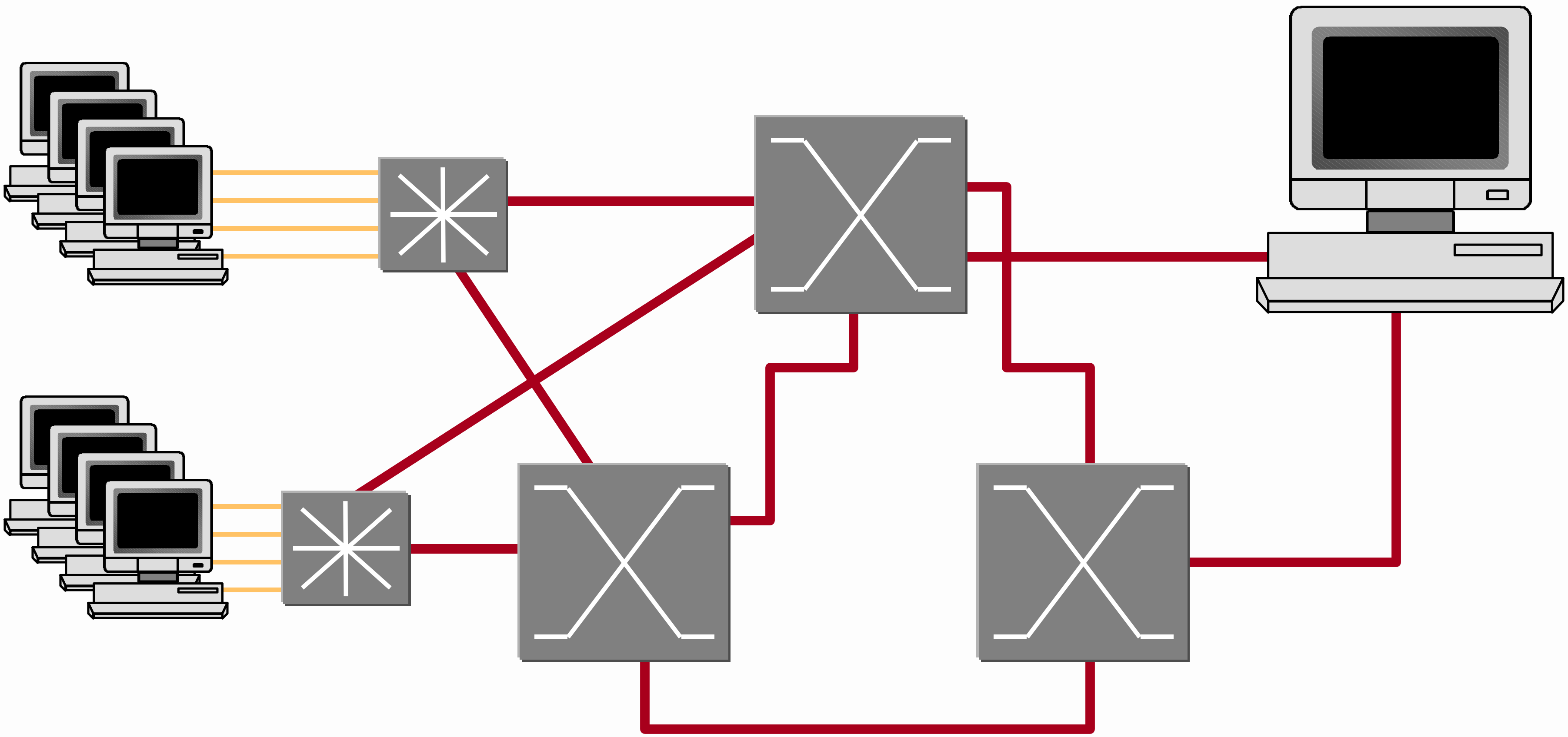
What I'll Be Covering...



In this module, I'll be concentrating on the specifications that define the logical interfaces within the ATM network.

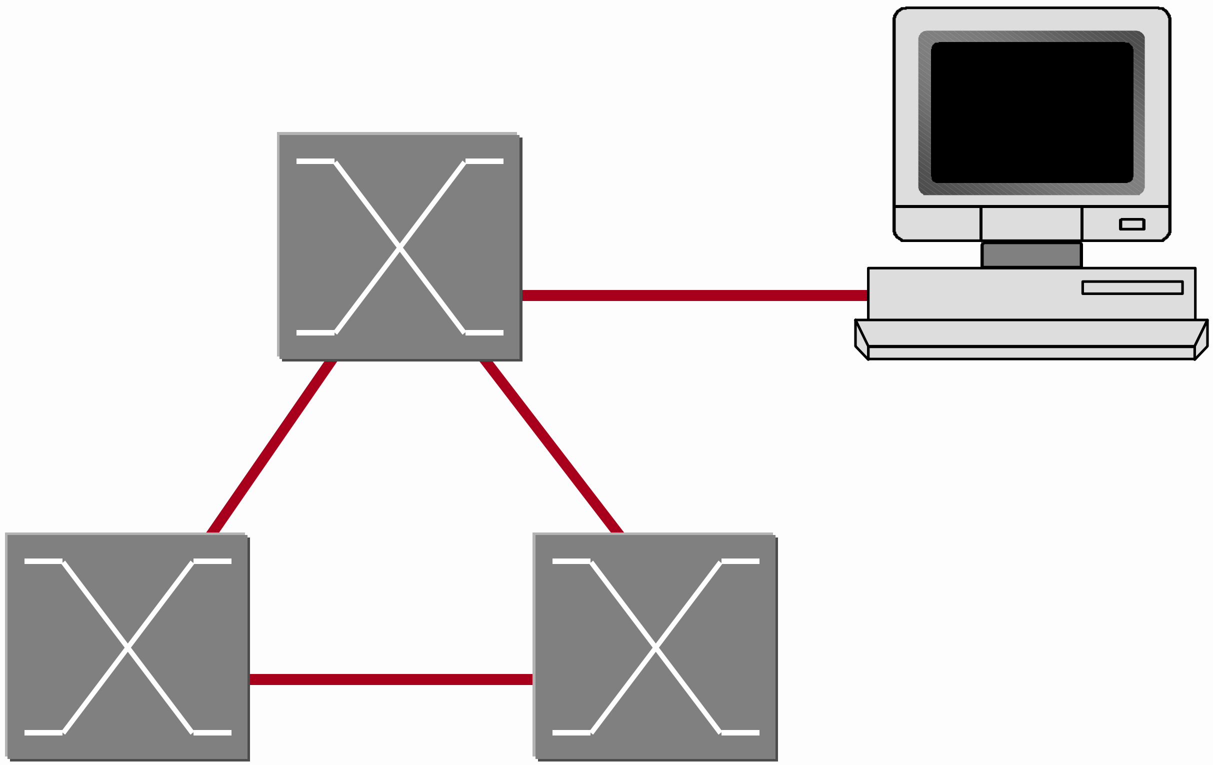
Most of these specifications are known as Foundation Specifications, because they form the basis of a set of services that operate over the ATM network.

Our ATM Network...



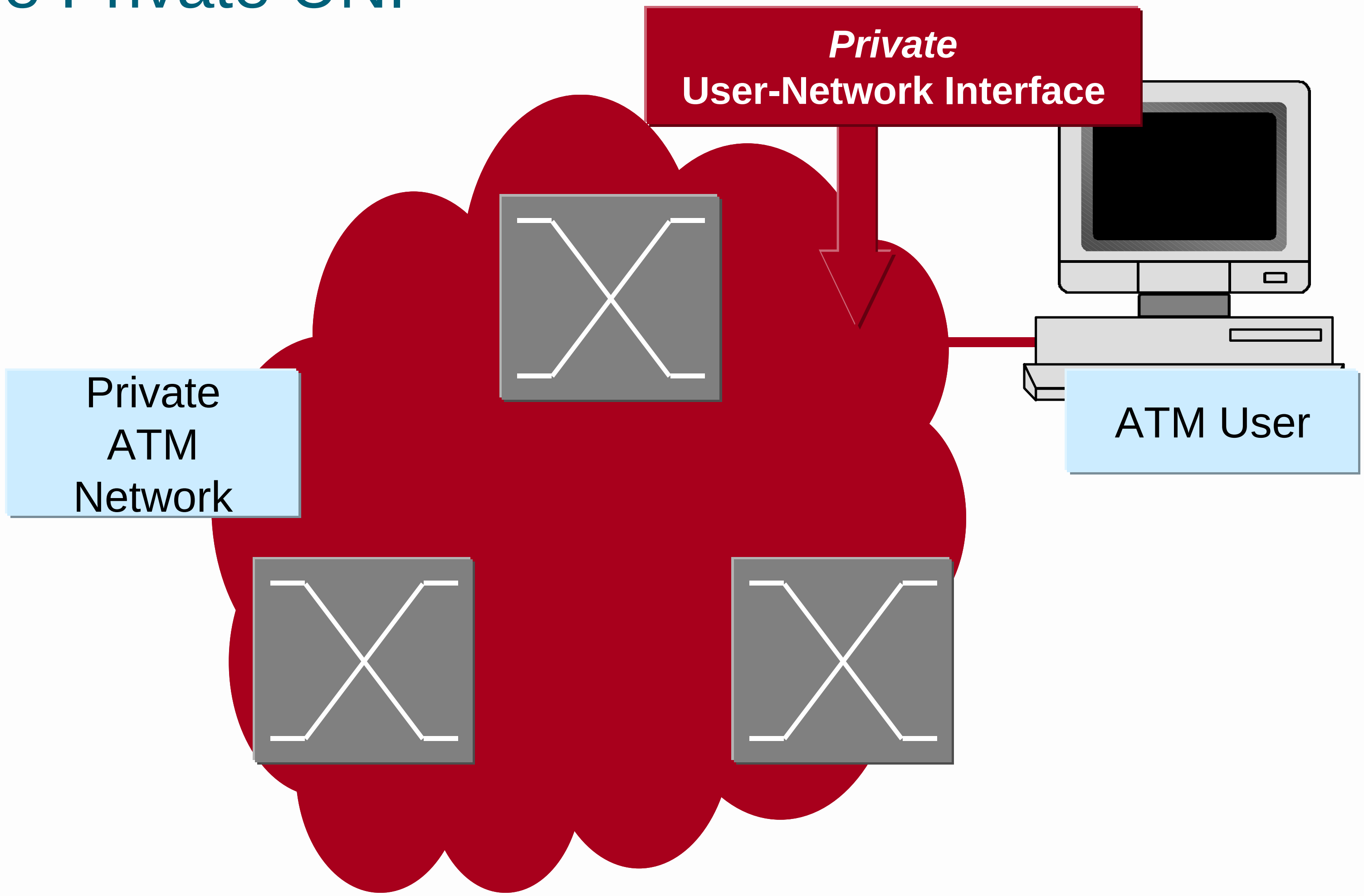
This is the basic ATM network we built earlier.

A Simplified View...



If I simplify this network down to a single ATM-connected device and the backbone of switches, you can see the connections more easily.

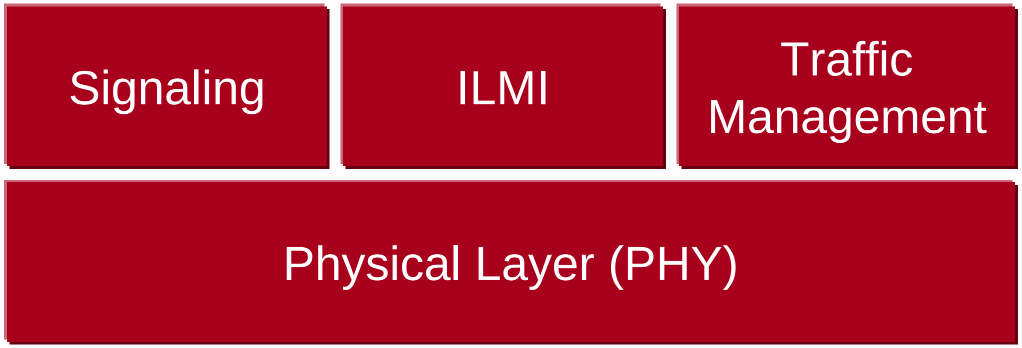
The Private UNI



The physical connection between the ATM-attached device and the network itself is defined by the User-Network Interface (UNI) standards.

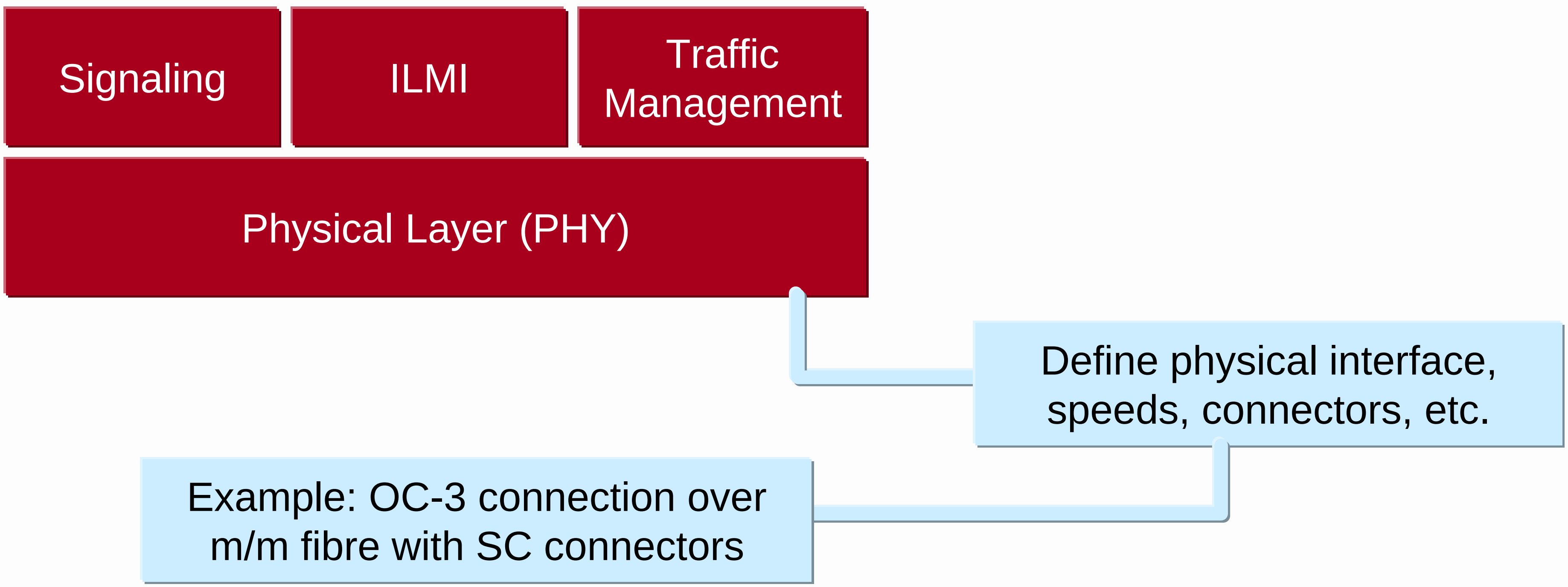
Because the network is a Private ATM network, this is the Private UNI.

UNI Components



If you refer back to the Anchorage Accord model, you'll see that the UNI is actually made up of four specific standards.

UNI Components

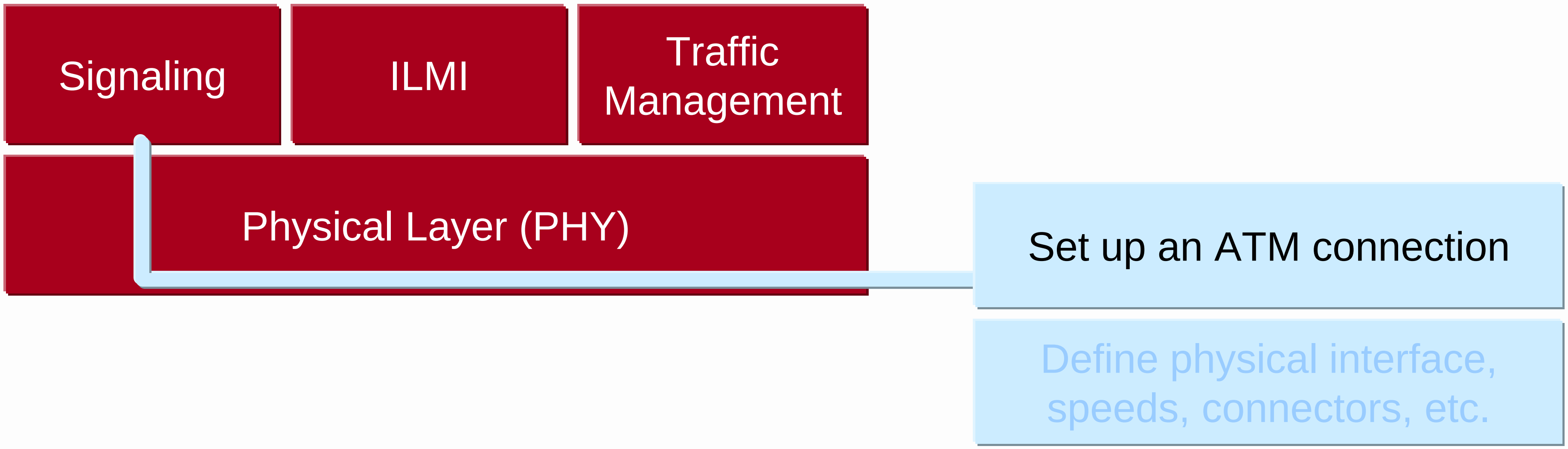


The PHY standard is the most obvious. In order to make any network connection, you need cables that carry signals. A standard is needed to define the rate of transmission, the encoding scheme, connector types and so on.

An OC-3c connection at 155Mbps over multimode fibre using SC connectors is one example. In fact, there are quite a few PHY standards currently ratified by the Forum, for use: 25Mbps (copper), 155Mbps (copper and fibre), 622Mbps (single and multimode fibre), 2.5Gbps, T1, T3, E1, E3, J2, and so on.

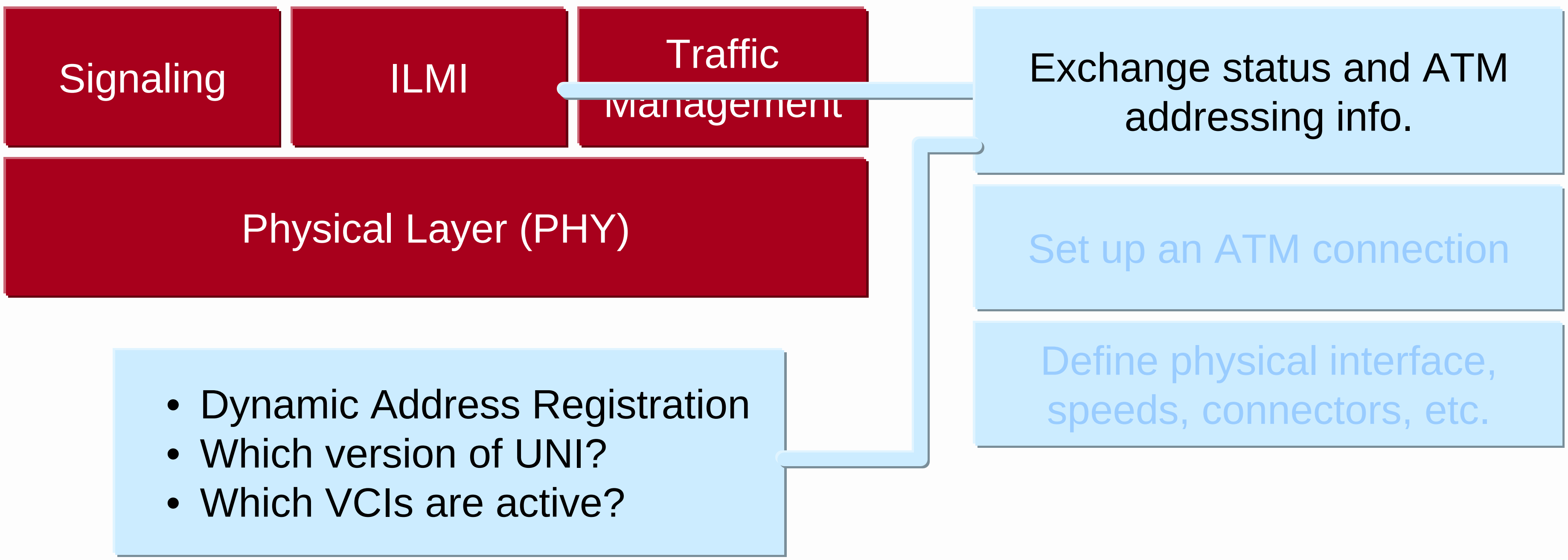
Standards will continue to emerge as ATM increases its connection speeds, and offers other forms of media (eg., plastic fibre).

UNI Components



A set of signaling protocols operates over the PHY layer. ATM signaling is the mechanism for the set-up, monitoring and tear down of connections.

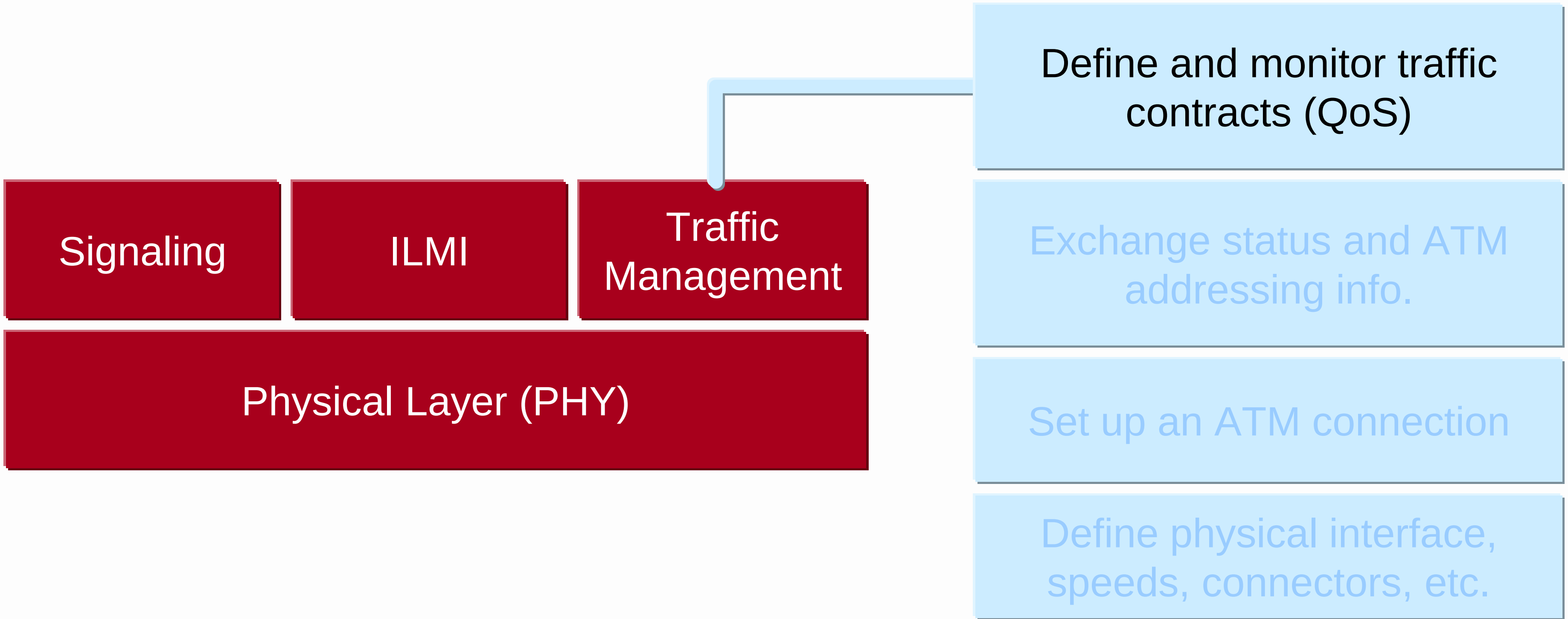
UNI Components



The Integrated Link Management Interface (ILMI) is an incredibly useful addition to the UNI. One of the biggest benefits ILMI brings is the automatic registration of ATM addresses between the switch and the ATM-attached device. This simple addition simplifies the operation of ATM networks drastically.

ILMI also carries status information about the link, and integrates this information into an SNMP MIB at the switch.

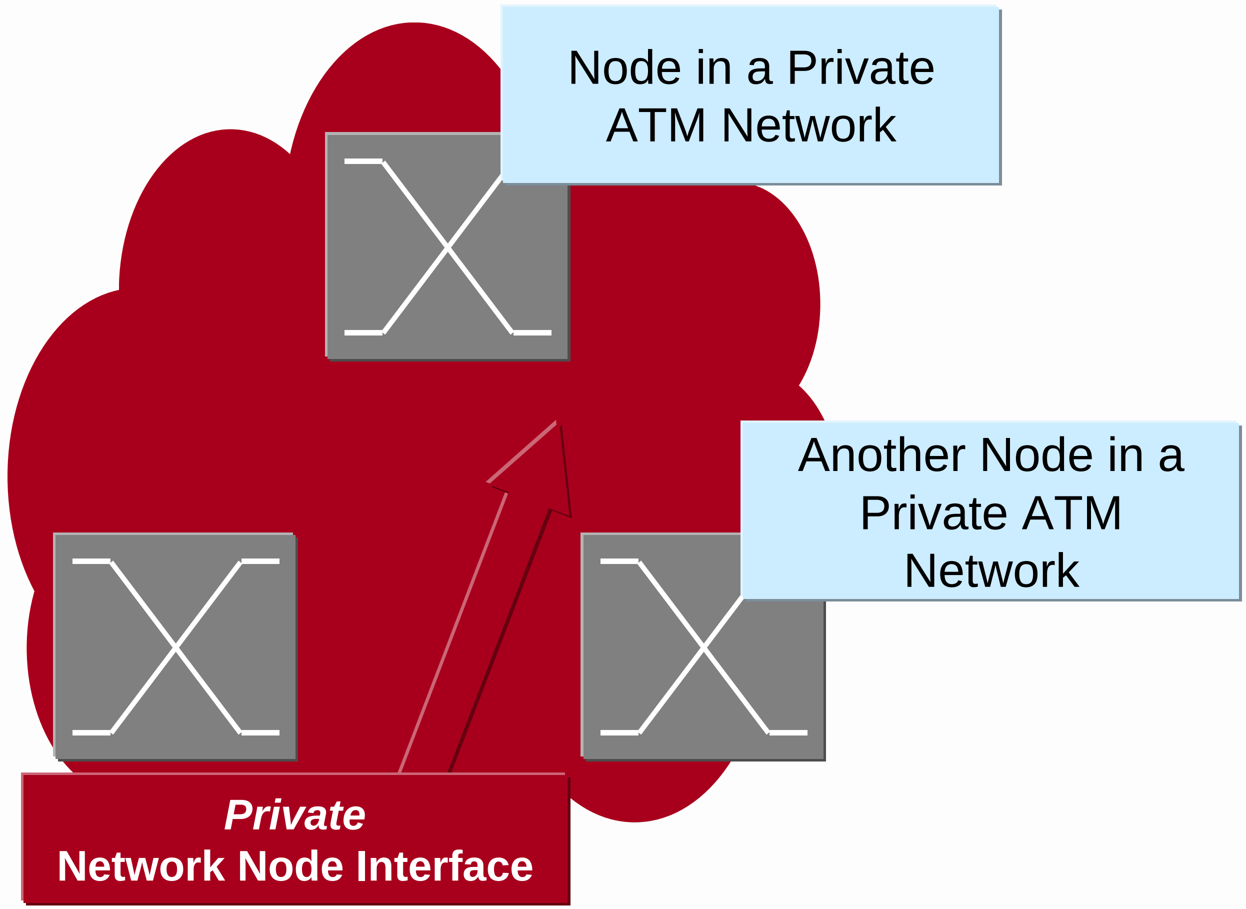
UNI Components



Traffic Management (TM) is the way that ATM switches monitor and regular the Quality of Service for a given VC over the UNI. Traffic Management 4.0 defines a number of QoS service classes: CBR, VBR-RT, VBR-NRT, UBR and ABR.

A connection can request one of these service classes in order to optimize its use of the bandwidth over the network.

The Private NNI



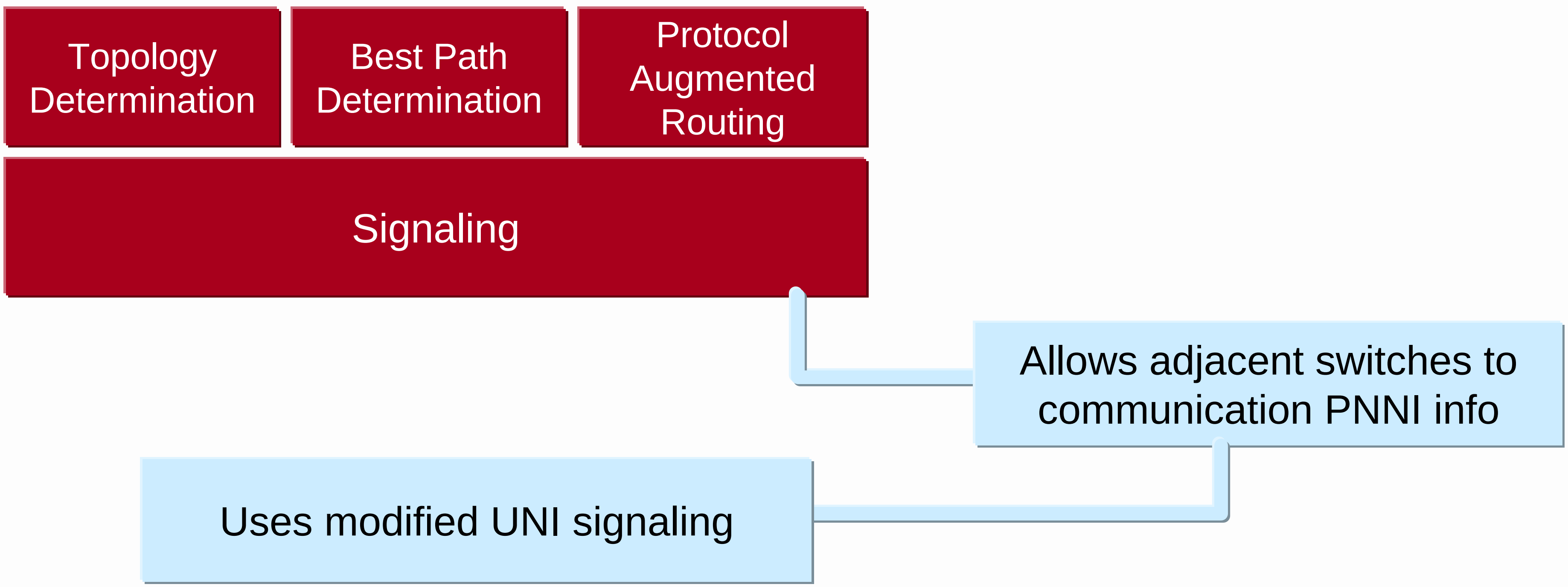
The Private Network Node Interface (PNNI) is ATM's equivalent of OSPF, or RIP. In short, it's a dynamic routing protocol.

However, PNNI is unique in that it operates over a connection-oriented network (OSPF and RIP are designed for connectionless networks), and it supports routing on the basis of QoS.

PNNI Components

Like the UNI, we can break PNNI down into four components.

PNNI Components



PNNI needs a signaling capability because ATM is a connection-oriented technology.

PNNI signaling uses a modified form of UNI signaling. The modification involves making the signaling process *symmetrical* because in a switch-to-switch connection there is no concept of a master/slave relationship.

In addition, PNNI requires additional *Information Elements* to be transported by the signaling message. These IEs allow PNNI to set QoS levels, and to create a *Designated Transit List* for signaling across the ATM network. (This PNNI-specific jargon is explained in another tutorial module).

PNNI Components

Topology Determination

Best Path Determination

Protocol Augmented Routing

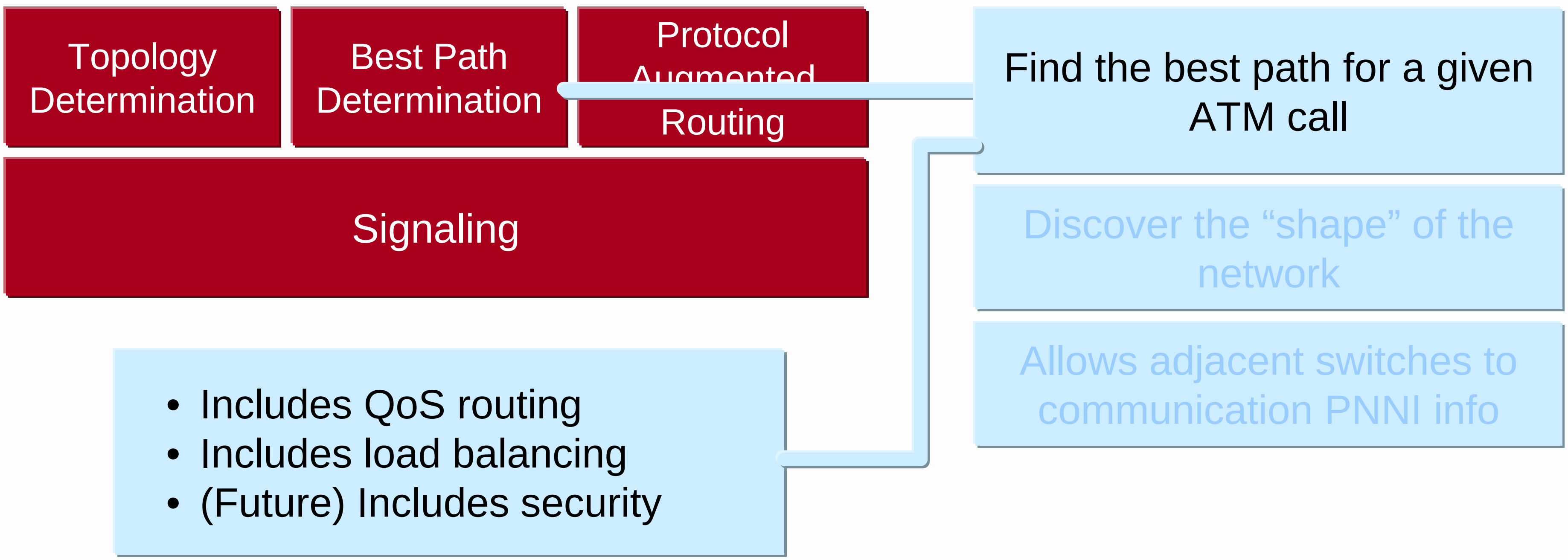
Signaling

Discover the “shape” of the network

Allows adjacent switches to communication PNNI info

As with a conventional routing protocol, the notion of routing is split into two processes. The first is Topology Determination, in which ATM switches discover their neighbors, and the addresses of ATM end systems attached to the various switches. Topology Determination occurs before any traffic passes over the network.

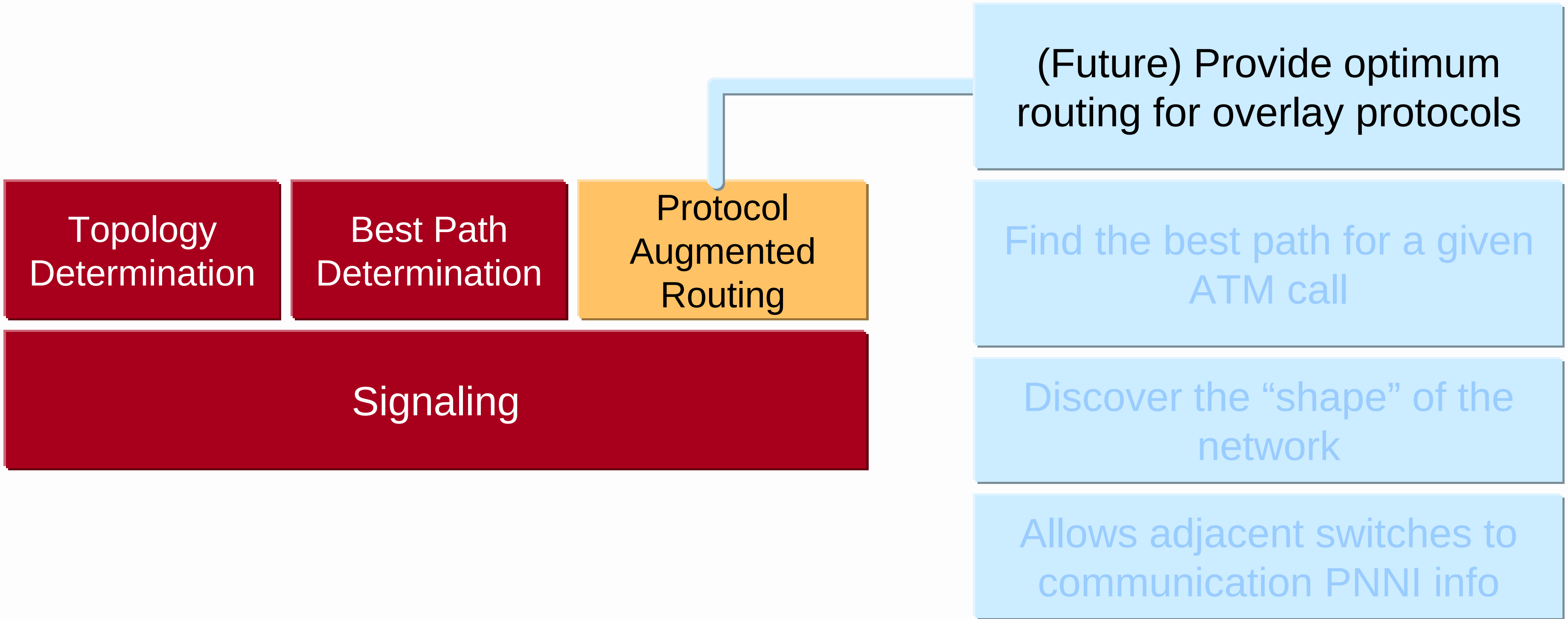
PNNI Components



Best path determination is the second phase.

Given that the ATM switches now understand the shape of the network, they are able to select the best path for a given connection based on the requested QoS.

PNNI Components

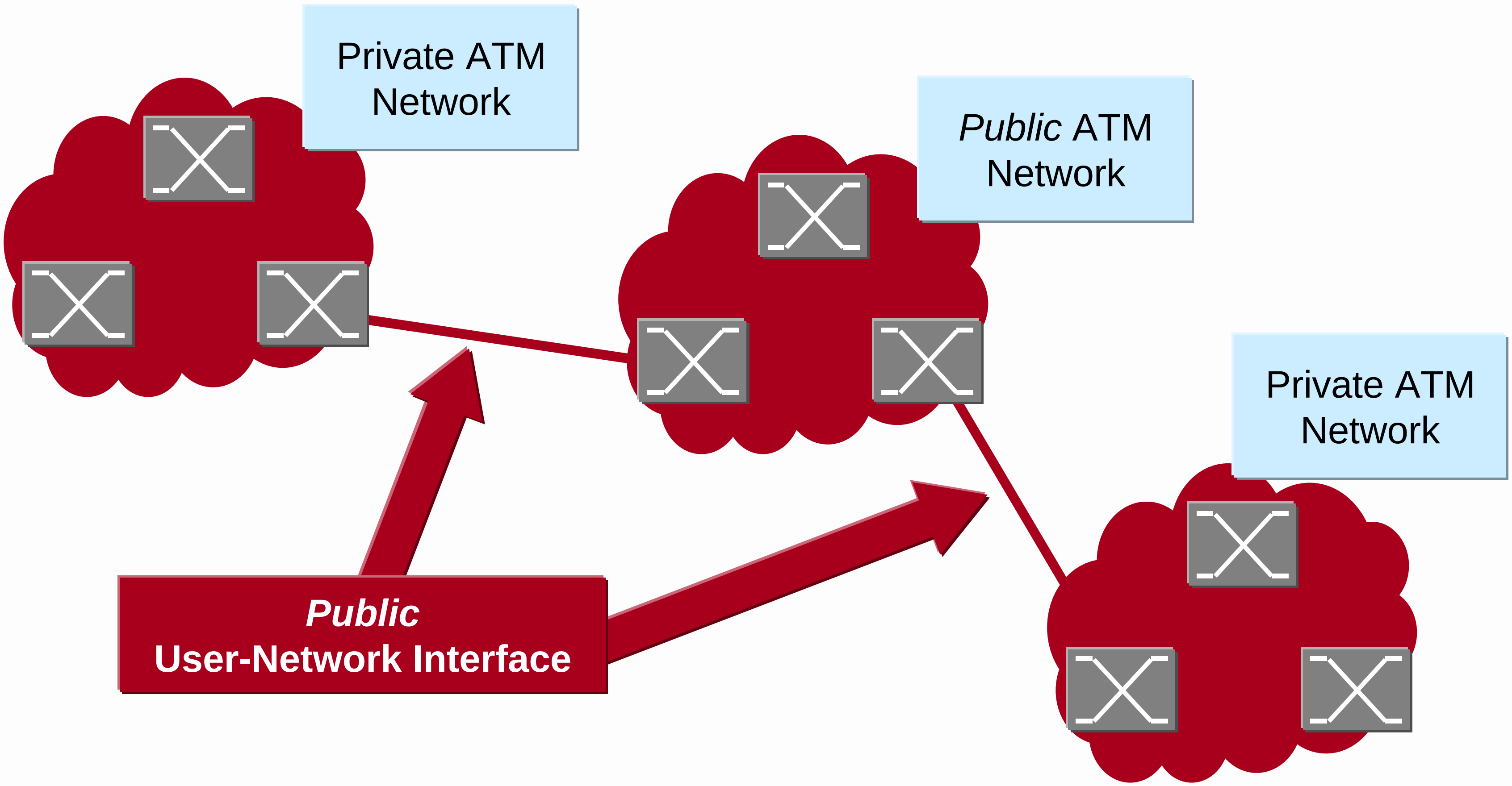


The final aspect of PNNI is based on a future enhancement-Protocol Augmented Routing (PAR). PAR is intended to allow PNNI to choose the best path for a connection based on both ATM topology information *and* overlay topology information.

In other words, if we’re using ATM as the transport infrastructure for a TCP/IP internetwork, then we can select routes that use IP information as well as ATM information.

Note, PAR is a simplified form of Integrated PNNI (I-PNNI).

The Public UNI



Another logical interface in an ATM network is the Public UNI.

This operates at the boundary between a Private ATM Network and a Public ATM Network. In effect, the Private Network is treated as a User of the Public Network (this is why it's UNI, not an NNI).

Public UNI Functions

- **Act a demarcation point between Private and Public Networks**
- **Potentially act as re-addressing point (eg., NSAP vs E.164 addressing)**
- **Logical boundary for call filtering operations (in SVC WANs)**
- **Logical boundary for SVC Tunneling (in PVC WANs)**

The Public UNI has a number of basic functions it must perform.

In essence it acts as the demarcation point for the Public Network.

Public UNI Functions

- Act a demarcation point between Private and Public Networks
- **Potentially act as re-addressing point (e.g., NSAP vs E.164 addressing)**
- Logical boundary for call filtering operations (in SVC WANs)
- Logical boundary for SVC Tunneling (in PVC WANs)

Because the Public Network may use a different addressing scheme from the Private Network, the Public UNI contains the ability to use subaddressing.

Public UNI Functions

- Act a demarcation point between Private and Public Networks
- Potentially act as re-addressing point (eg., NSAP vs E.164 addressing)
- **Logical boundary for call filtering operations (in SVC WANs)**
- Logical boundary for SVC Tunneling (in PVC WANs)

In a switched virtual circuit (SVC) environment, the Public UNI can be regarded as a security demarcation point, in that call filtering schemes can be concentrated here.

At the time of writing, most ATM WANs are still based on PVCs, however.

Public UNI Functions

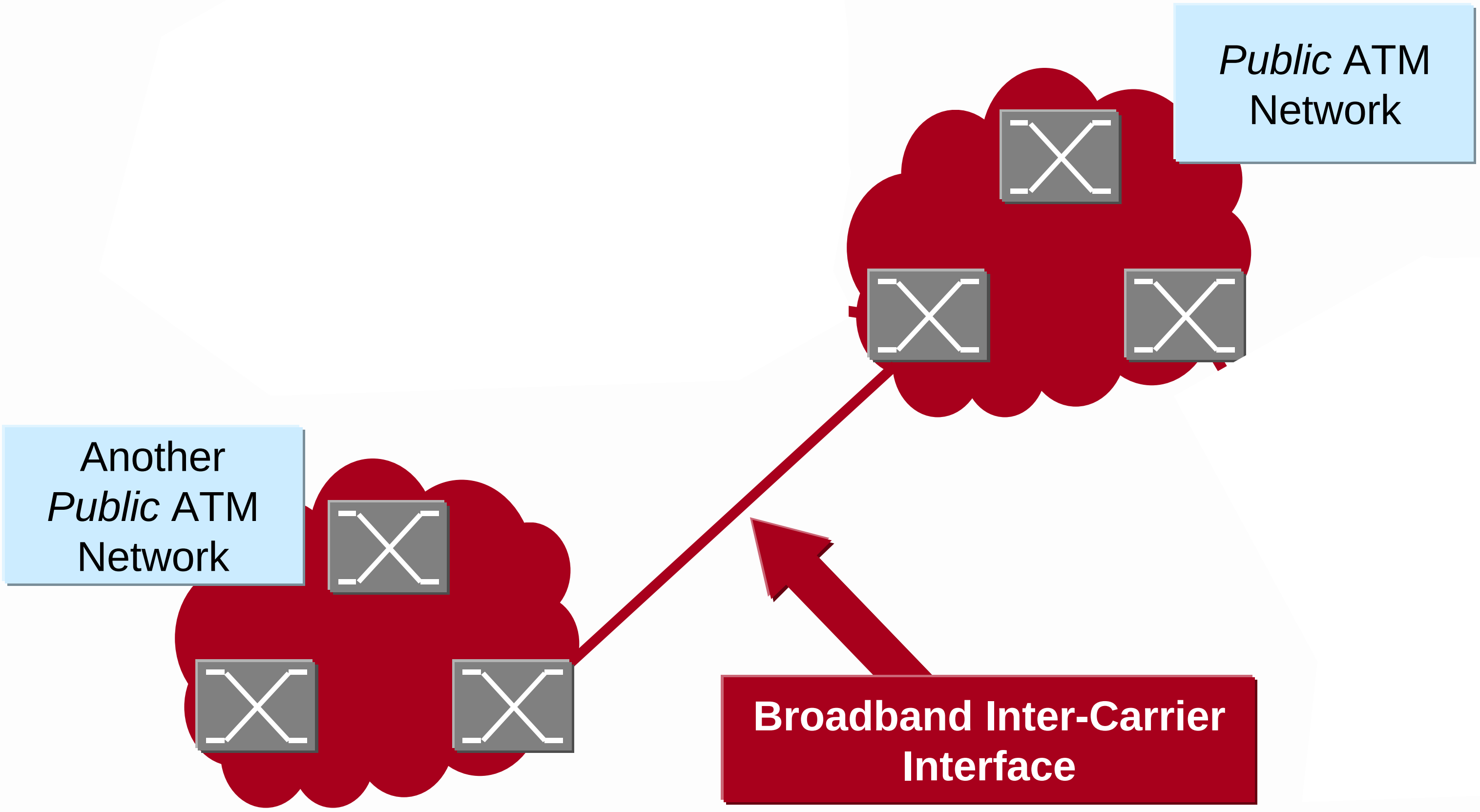
- Act a demarcation point between Private and Public Networks
- Potentially act as re-addressing point (eg., NSAP vs E.164 addressing)
- Logical boundary for call filtering operations (in SVC WANs)
- **Logical boundary for SVC Tunneling (in PVC WANs)**

In an PVC environment, the Public UNI is the place where SVC Tunneling can take place.

Tunneling allows an SVC to pass from one Private Network to another, over a Public, PVC-based network.

SVC tunneling can also operate within a single ATM network, but it is most often found at a demarcation point such as the Public UNI.

The Broadband ICI



When two Public ATM networks are connected, they operate over the Broadband Inter-Carrier Interface (B-ICI).

The B-ICI allows large-scale Telecommunications standard to be implemented. One of the most obvious aspects of an inter-carrier connection is that Carrier A is somewhat concerned at revealing too much of the internal structure of the network to Carrier B, since this would be a good source of competitive information. B-ICI acts as a routing information concentration point, rather like EGP and BGP do for TCP/IP internetworks.

Summary

- **Logical Interfaces act as boundary points in an ATM Network**
  - » **Legacy protocol stacks have them too, but not in a consistent or documented format**
- **The associated protocols form the foundation of the ATM Forum migration model**
- **Service protocols are built on these foundations**

So to summarize.

Logical interfaces act as boundary or demarcation points in an ATM network. Different demarcation points demand different functions, and associated protocols.

Legacy protocol stacks such as TCP/IP and Netware also have these demarcation points, but they are usually informally documented, and inconsistent.

Summary

- Logical Interfaces act as boundary points in an ATM Network
  - » Legacy protocol stacks have them too, but not in a consistent or documented format
- **The associated protocols form the foundation of the ATM Forum migration model**
- Service protocols are built on these foundations

The protocols associated with the logical interfaces form the foundation of the Anchorage Accord model. Later versions of these protocols will be backwards compatible with the current baseline specifications.

Summary

- Logical Interfaces act as boundary points in an ATM Network
  - » Legacy protocol stacks have them too, but not in a consistent or documented format
- The associated protocols form the foundation of the ATM Forum migration model
- **Service protocols are built on these foundations**

A range of services for data, voice and video are built on top of the foundation specifications.