Deployment of IPv6 at Ss. Cyril and Methodius University in Skopje

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Introduction

- February 2011 - IANA allocated the last five blocks of /8 IPv4 addresses to each of the five RIRs.
- The implementation of IPv6 is the only way to ensure the future growth of the Internet.
- Implementation of IPv6 is not an easy task, due to the fact that IPv6 is not backward compatible with IPv4.
- One cannot just switch from IPv4 to IPv6. There are several strategies and different deployment models involved in the process, and there is no a single best solution.
- In this presentation
  - a survey of different models for IPv6 deployment
  - the implementation of dual stack model at UKIM

Transition mechanisms

- **Dual stack**
  - both IPv4 and IPv6 are enabled on the network
  - adds IPv6 functionality to the network
  - everything on the network needs to be done twice
- **Tunneling**
  - used for interconnection of separated IPv6 islands
  - tunnels can be configured manually or automatically
  - the advantages and disadvantages depend on the chosen mechanism
- **Translation**
  - interconnection of hosts that run a different version of IP
  - there is no need to change the configuration of the hosts
  - breaks the end-to-end connectivity, which is considered a core concept of the Internet

IPv6 Rapid Deployment (6rd)

- Recommended tunneling mechanism
- Used for transferring IPv6 packets across an IPv4 network
- Uses 32 bits of IPv6 address to map the entire IPv4 address space
- The IPv6 service provided is equivalent to native IPv6
- Two main routers:
 - 6rd Customer Edge
  - 6rd Border Relay
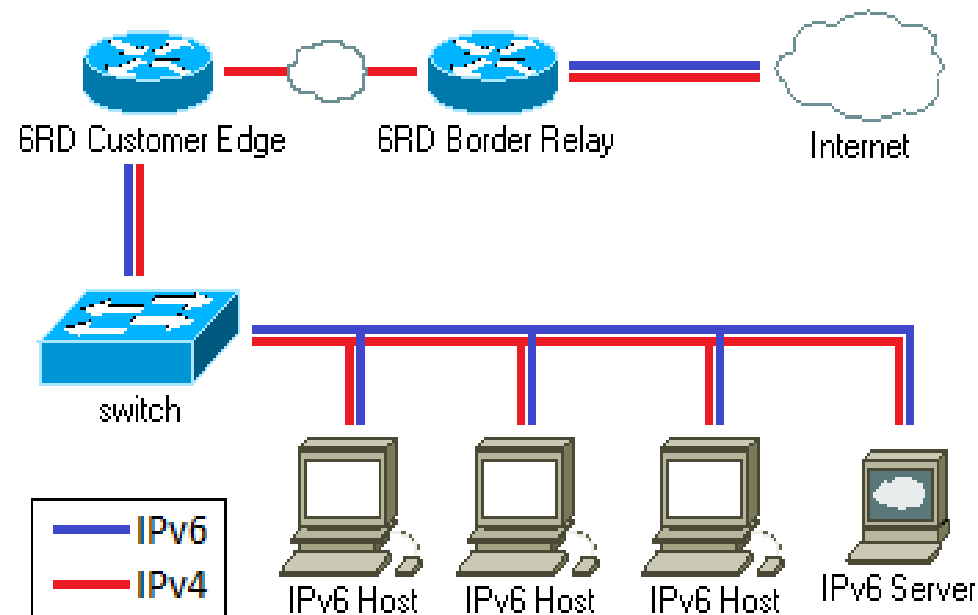
NAT64/DNS64

- Recommended translation mechanism
- A combination of Stateful NAT64 and DNS64
- Used for interconnection between IPv6-only hosts and IPv4-only hosts
- It works automatically only when an IPv6 host is the initiator of a communication (for an IPv4 host to be able to reach an IPv6 host, a static translation needs to be configured manually)
- Two servers: NAT64 server and DNS64 server
- The NAT64 server is the one that translates packets between the IPv6 network and the IPv4 network, and vice versa.
- The DNS64 server is the one that creates representations of IPv4 addresses in the IPv6 world.
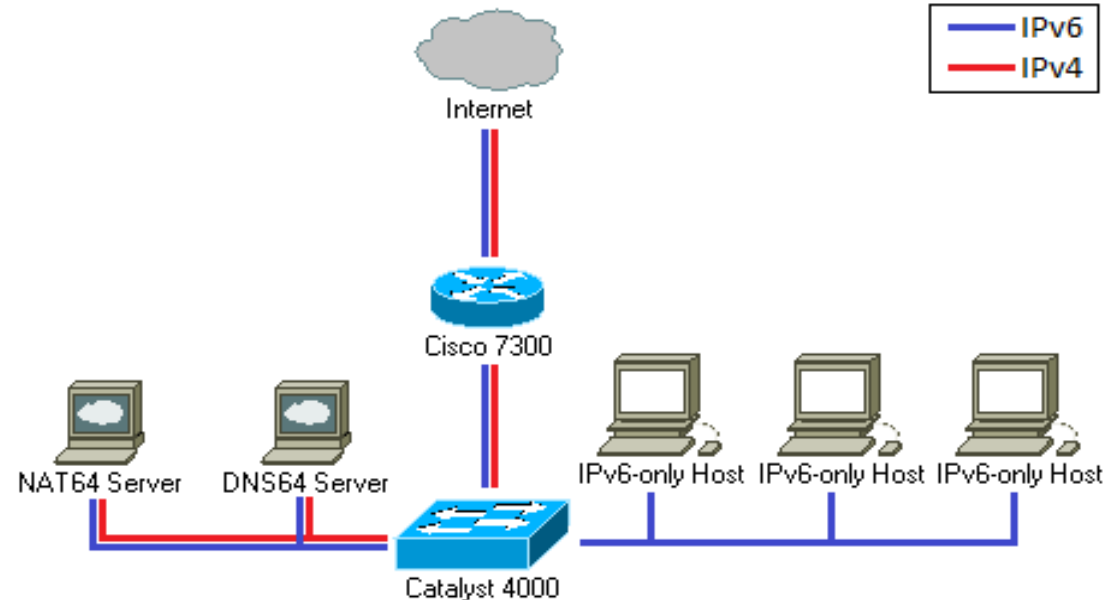
Deployment of IPv6 at UKIM

- All of the UKIM faculties, grouped into six campuses, and several institutes (a total of 28 parties) are connected to a single computer network, called the University Computer Network.
- Our goal is to implement IPv6 at the University Computer Network, and finally to switch over to IPv6 only.
- We have decided that the best method for deployment of IPv6 at the University Computer Network is the dual stack model.

# The dual stack implementation at UKIM
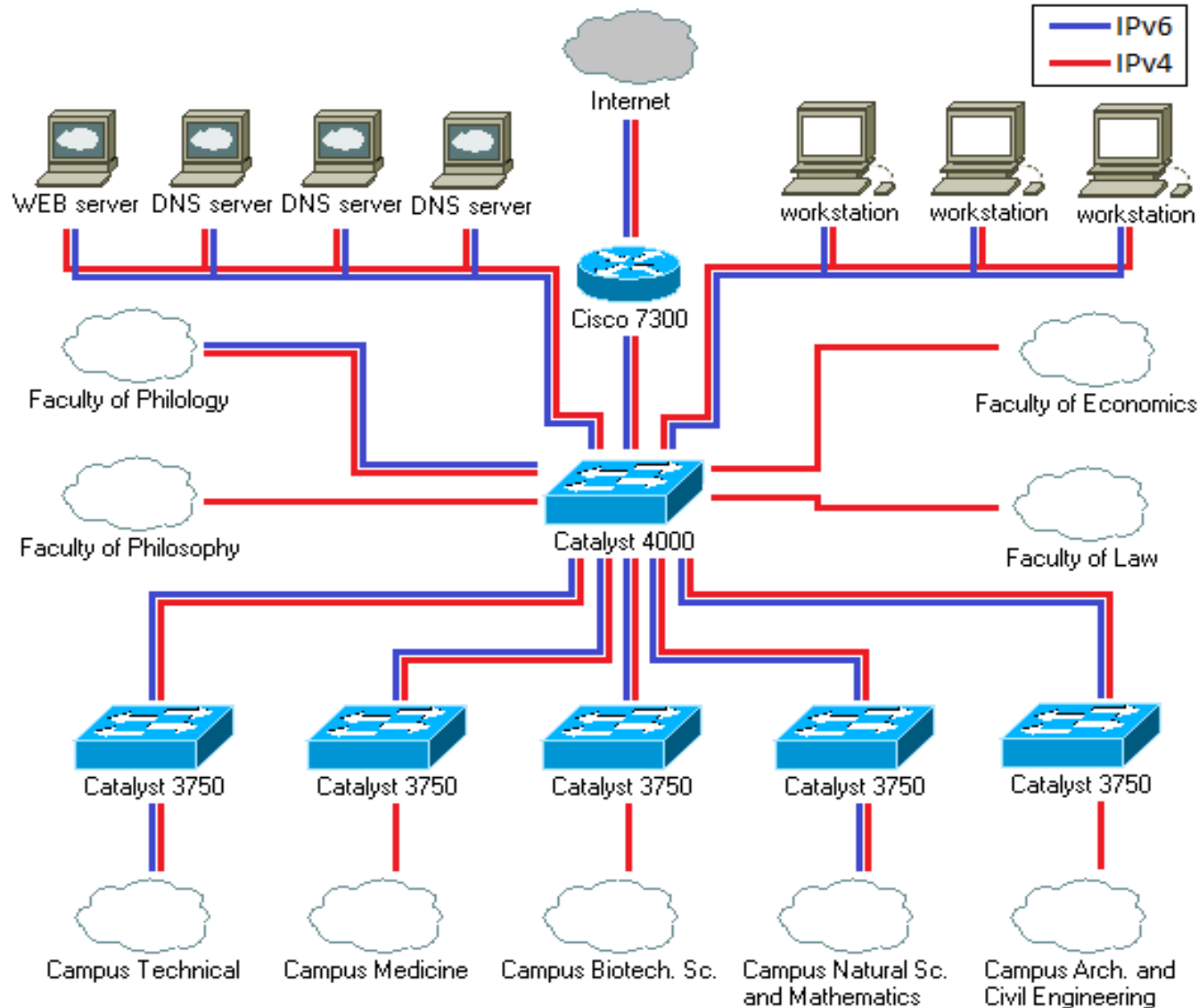
The dual stack implementation at UKIM

- We have implemented the dual stack model at the backbone of the University Computer Network, by enabling the IPv6 protocol on every routing device, and assigning an IPv6 address to every interface that already had an IPv4 address.
- At this point, every UKIM faculty's main default gateway is a dual stack device.
- The University Computer Network has also a dual stack connection to the Internet.
- There are three faculties that have partial implementation of the dual stack model. The other faculties haven't yet implemented the dual stack model, mostly because of lack of manpower and equipment support.

The dual stack implementation at UKIM

- At the University Computer Centre, for production and testing purposes, we have configured the dual stack model on
    - three workstations
    - one web server (the official UKIM website server)
    - one mail server
    - one database server
    - three DNS servers (one of these is the primary DNS server for .mk ccTLD)
- We also plan to implement a full dual stack solution at the UKIM Rector's Office, and armed with this experience, to support full IPv6 implementation at UKIM faculties.

The dual stack implementation at UKIM

1 - Server subnet 1
2 - Server subnet 2
3 - Network adminis-
    trators subnet
4 - Users subnet
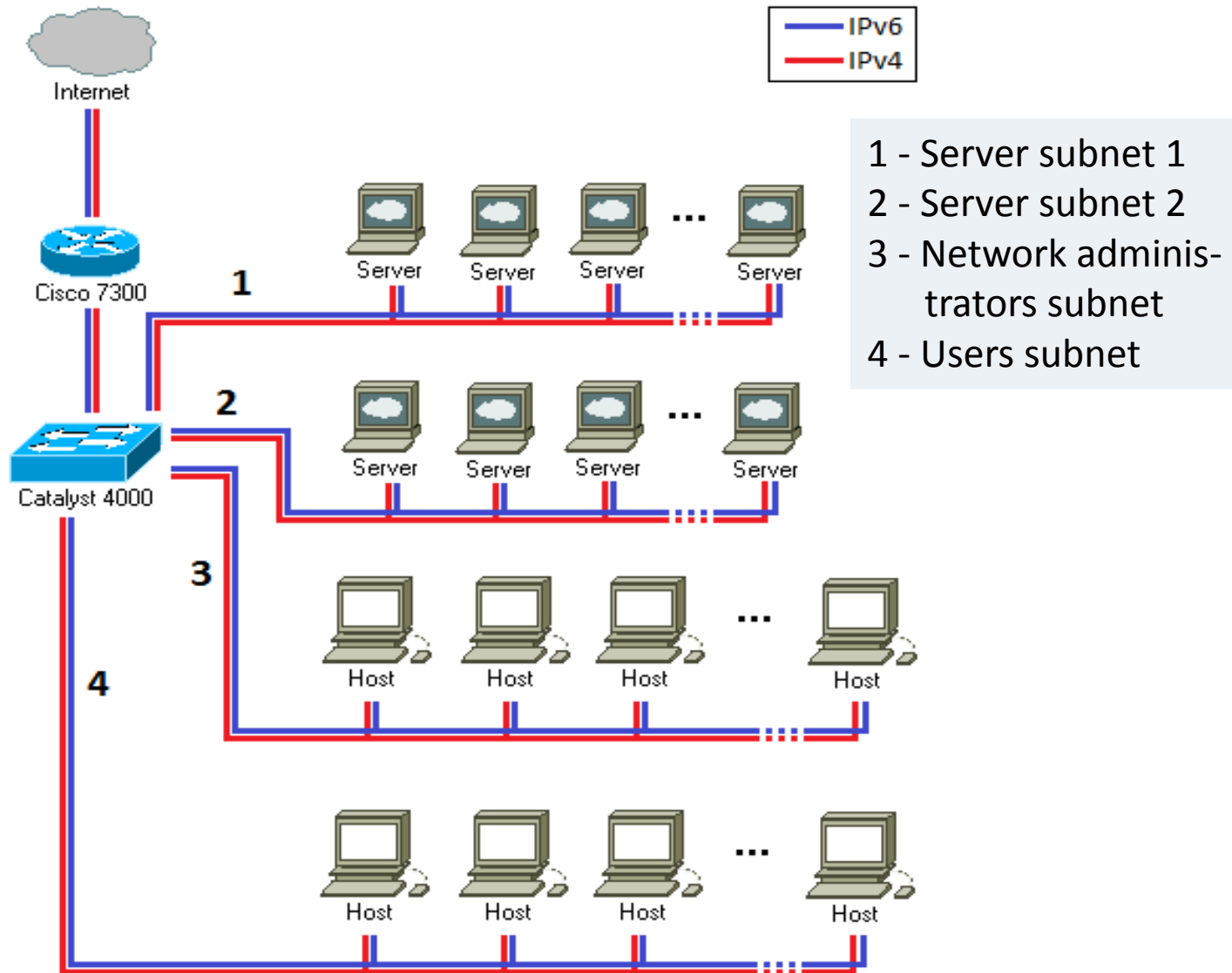
Conclusion

- IPv6 is the future of the Internet.
- The implementation of IPv6 is not an easy task. There are different transition mechanisms that can be used, and each of those is used for its specific purpose.
- It is very important for companies and institutions to choose the right transition mechanisms that can meet the requirements of their networks.

Questions?

Thank you