

Мрежи за достъп от следващо поколение

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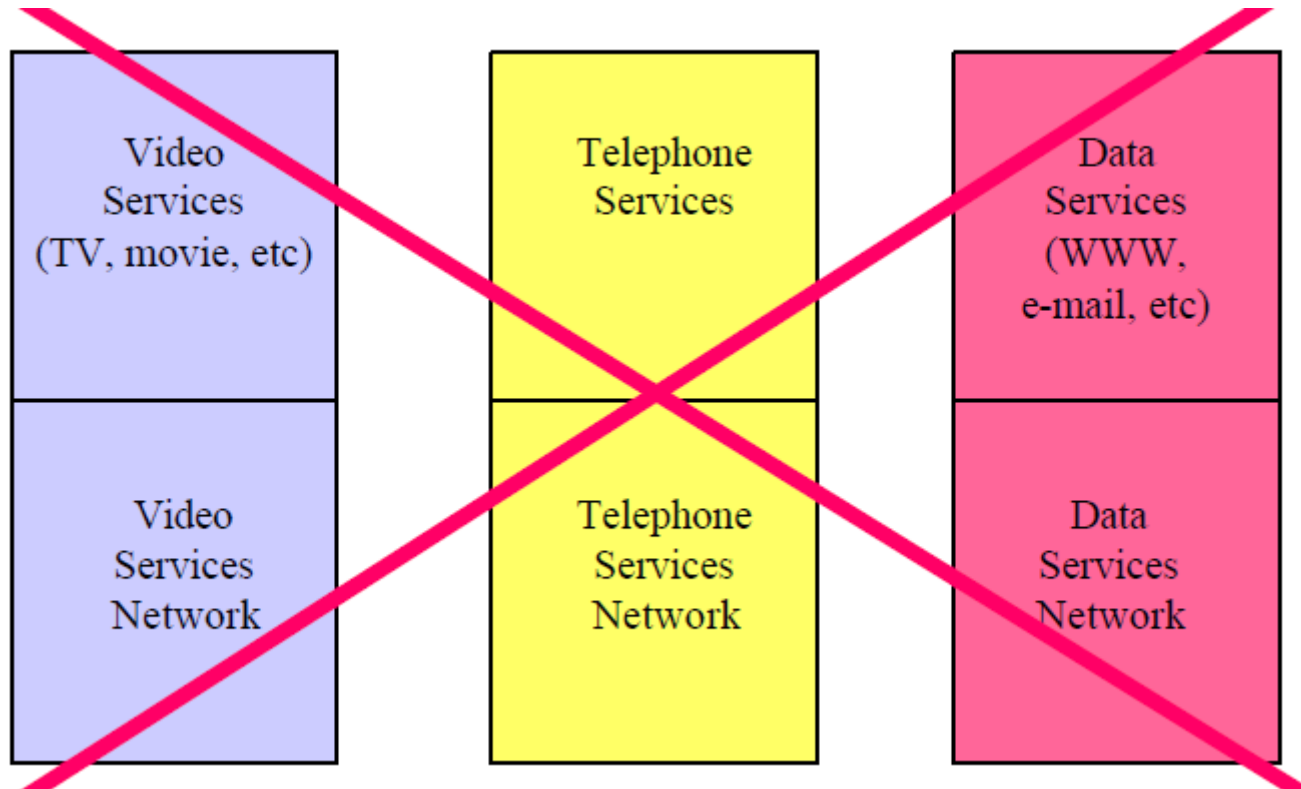
Нов български университет

СЪДЪРЖАНИЕ

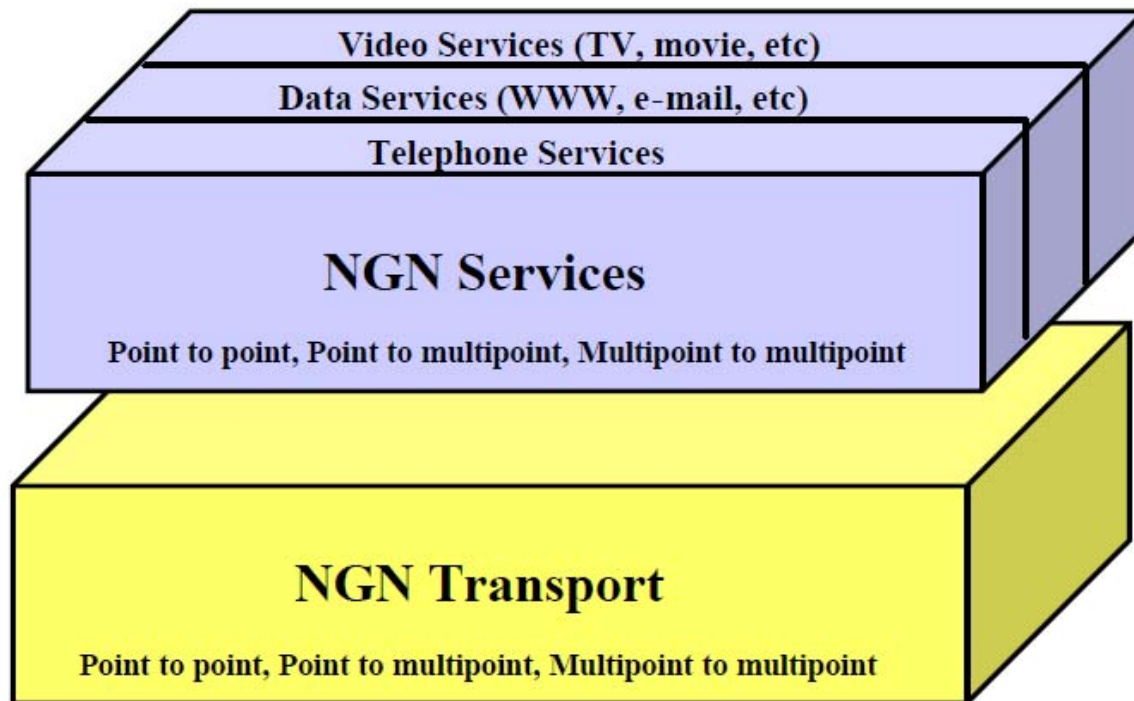
- NGN - Определение и същност
- Основни градивни блокове – ATM (ще разгледаме подробно), PPP, Frame Relay, SDH, Ethernet
- DSL референтен модел
- Работа с мрежови симулатор (dynamips) и с трафичен снифер (wireshark) програма

Въведение в телекомуникациите

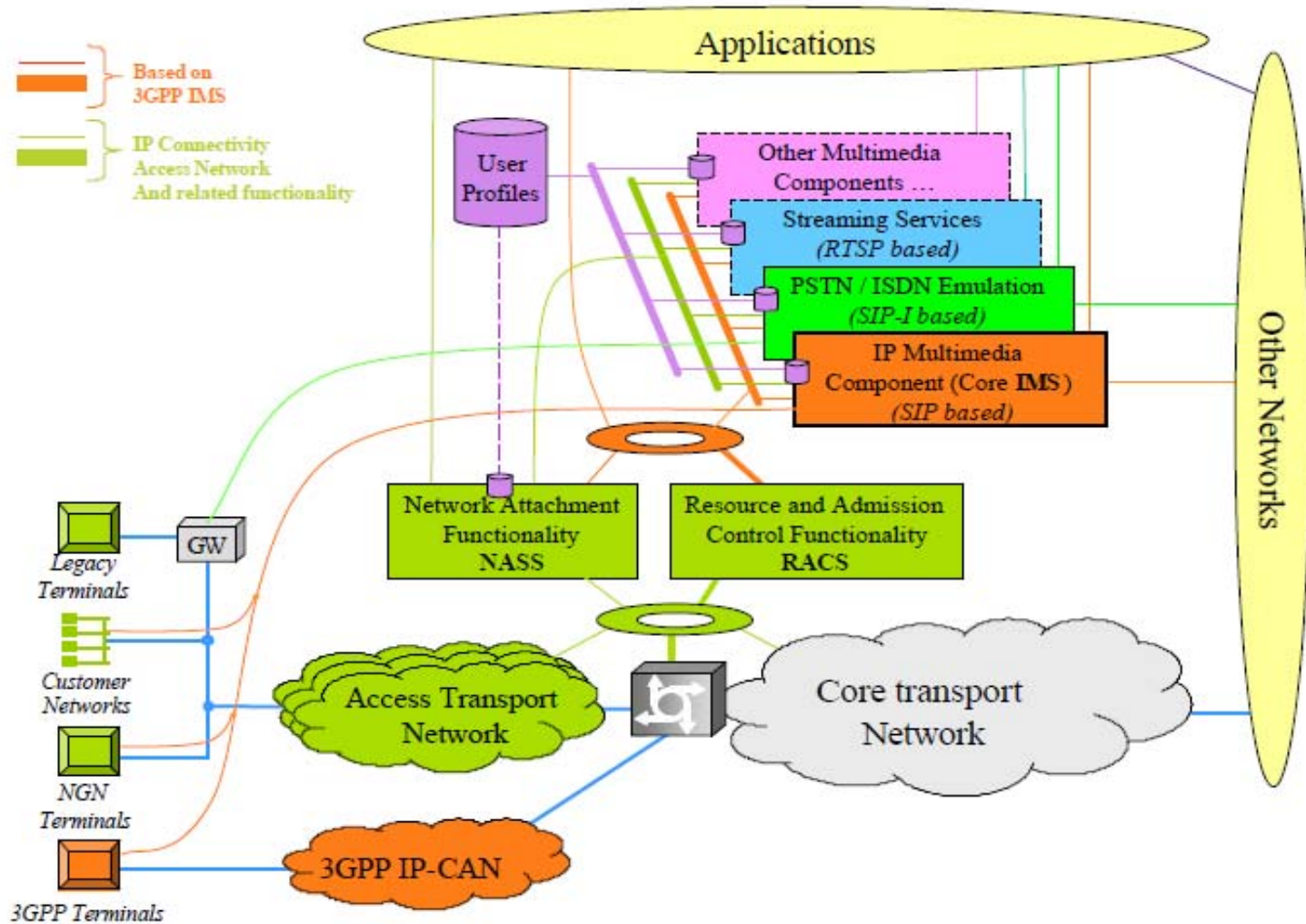
Вертикален Модел



Хоризонтален модел



NGN – Компоненты и подсистемы

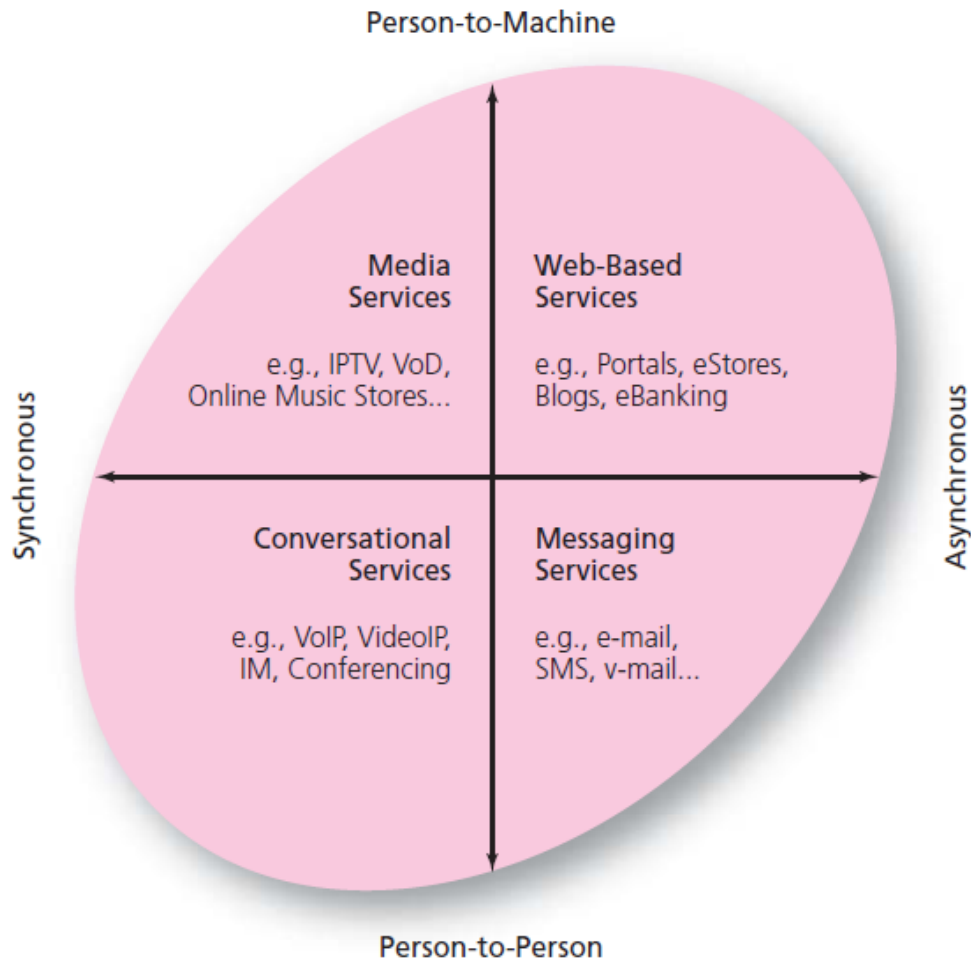


NGN основна идея

Основната функционалност, принцип и изискване към всяка мрежата от следващо поколение е да:

Може да осигури услуги от всякакъв тип върху всякаква транспортна среда.

Услуги в NGN



Building Blocks - ATM

- **Asynchronous Transfer Mode**
- 53 byte cells – 48 bytes payload 5 bytes header
- ATM adaptation layer
 - AAL1 used for CBR
 - AAL2 used for VBR
 - AAL3/4 – Data service (rarely used)
 - AAL5 – Data services
- Uses commutation on VP and VC level

ATM cell

- ATM cells

Diagram of the UNI ATM Cell

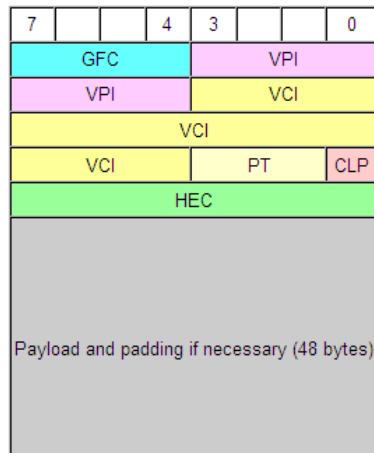
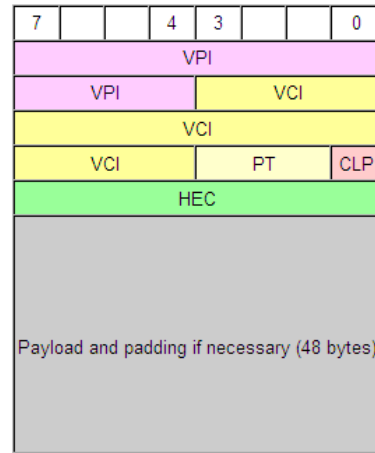


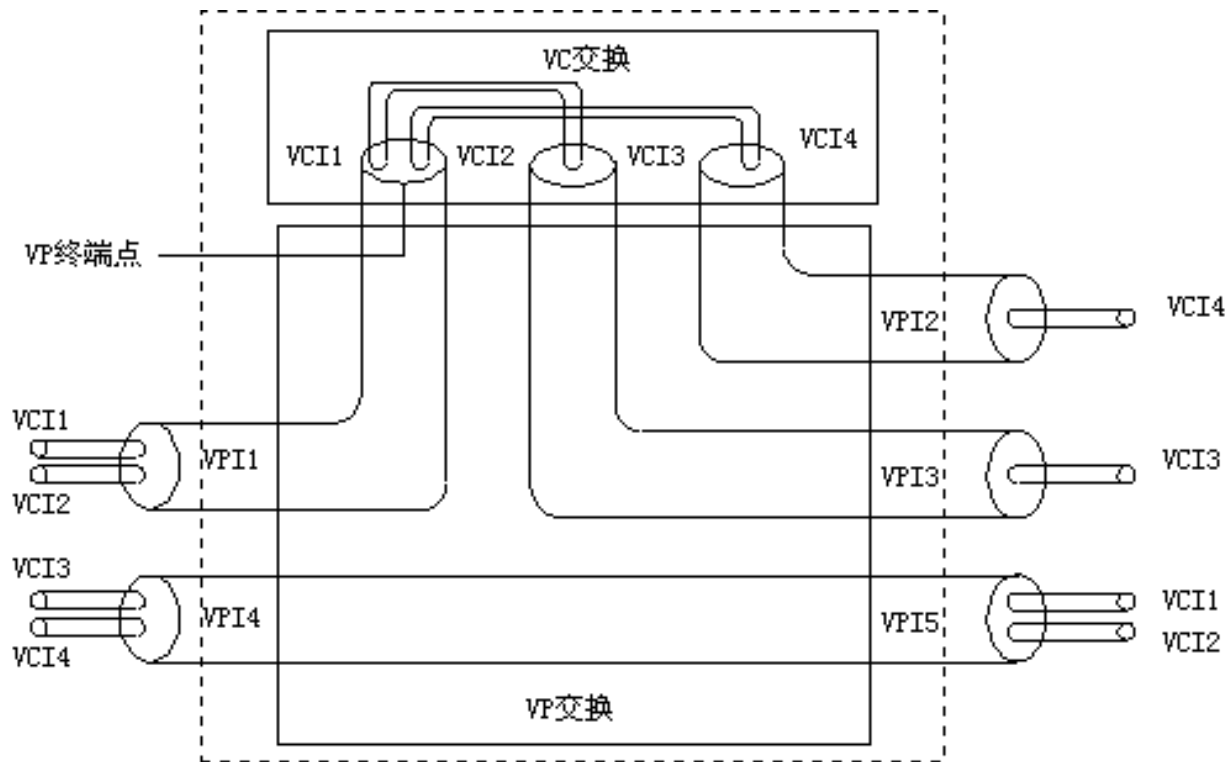
Diagram of the NNI ATM Cell



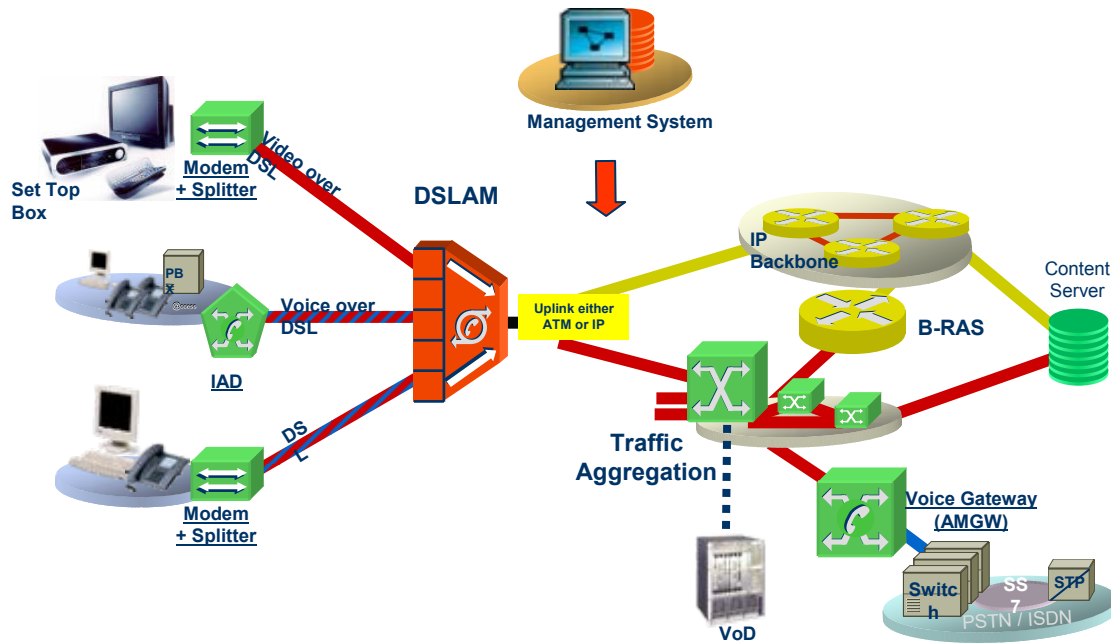
- ATM Cell fields

- GFC = Generic Flow Control (4 bits) (default: 4-zero bits)
- VPI = Virtual Path Identifier (8 bits UNI) or (12 bits NNI)
- VCI = Virtual channel identifier (16 bits)
- PT = Payload Type (3 bits)
- CLP = Cell Loss Priority (1-bit)
- HEC = Header Error Control (8-bit CRC, polynomial = $X^8 + X^2 + X + 1$)

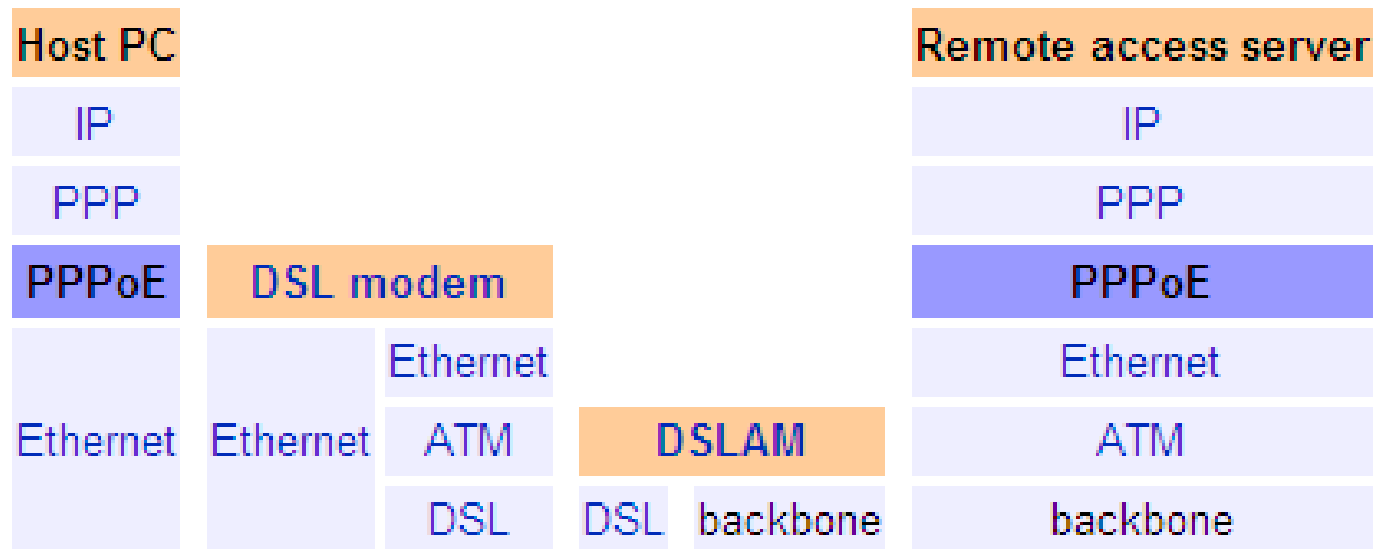
ATM 组网



DSL референтен модел



DSL protocol stack



PPPOE wholesale model

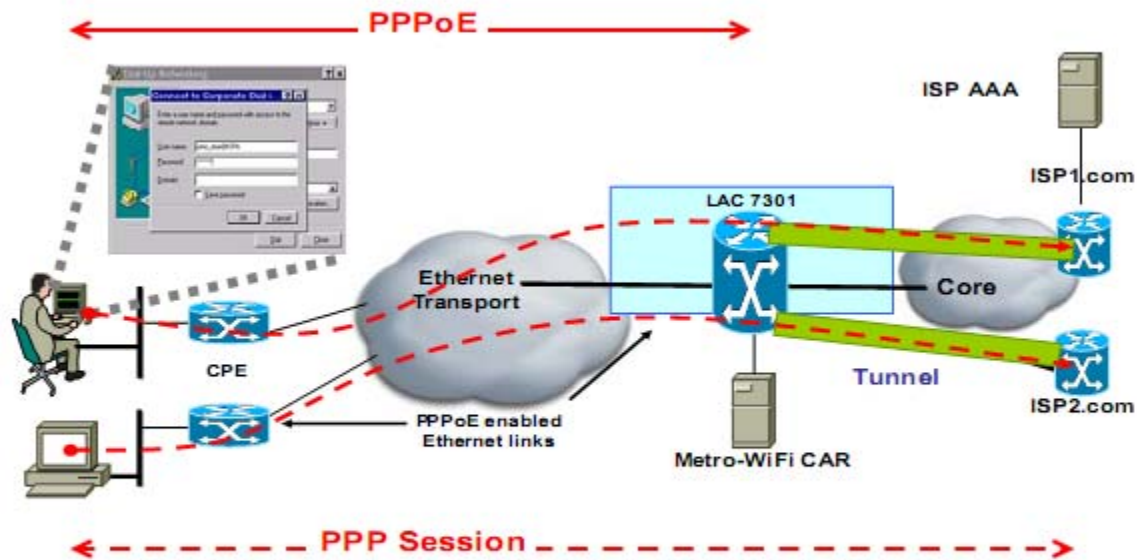


Figure 66 - PPPoE service model

PPPOE Call flow

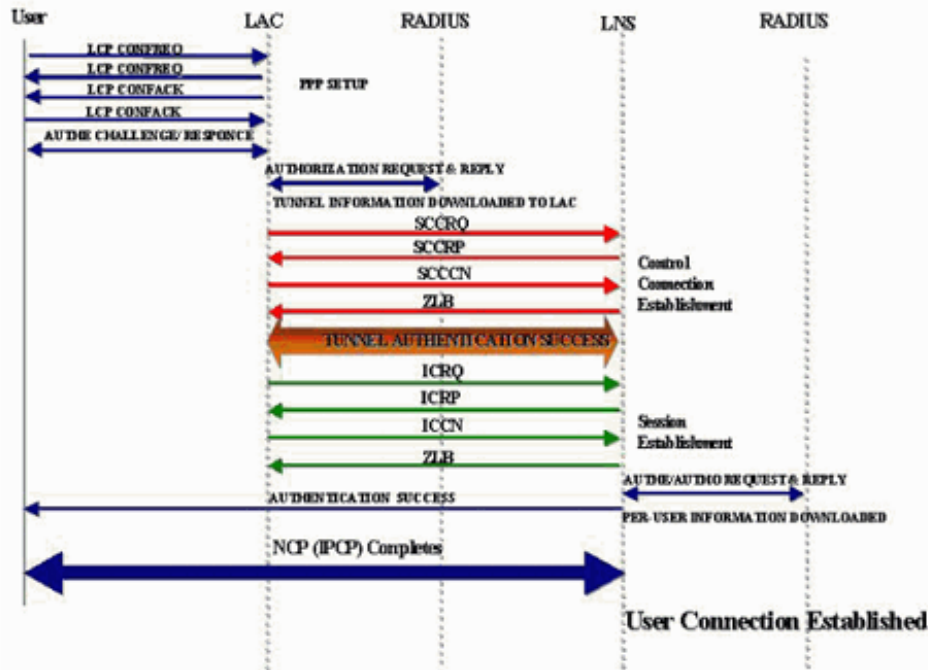


Figure 68 - Complete Call flow

DSL Access MUX - DSLAM

- The DSL access multiplexer (DSLAM) is a traffic aggregation device that multiplexes upstream and downstream information in a DSL network.
- The DSLAM is usually located in the Central Office and connects to the CO switch to support analog voice service.
- On the network side, the DSLAM can interface with ATM, IP or any other broadband service.
- On the local loop side, the DSLAM supports multiple types of DSL - ADSL/ADSL2, G.SHDSL and VDSL
- The functionality of a DSLAM varies greatly among different vendor products.

BRAS (Broadband Remote Access Server)

- **Some high level functional requirements for the BRAS are listed below:**
 - ability to support PPP sessions into L2TP tunnels (LAC function).
 - ability to terminate PPP sessions and assign routing attributes based on subscriber profile (LNS function).
 - support of authentication using RADIUS.
 - support of IP over bridged Ethernet (IETF RFC 2684) PPPOE.
 - support of address allocation using Dynamic Host Configuration Protocol (DHCP).
 - support of multiple VCs per subscriber.
 - optional support ATM VC/VP cross-connection functions independent of AAL type.
 - support of termination and aggregation of ATM VCs.
 - Optional support of the following ATM classes of service: UBR, UBR+, CBR, VBR-nrt, VBR-rt .
 - allocation of downstream bandwidth based on policy configuration across ATM, PPP, Ethernet, and IP technologies.
 - Has to support Various QoS mechanisms (Policing, shaping, Queuing, marking, scheduling)

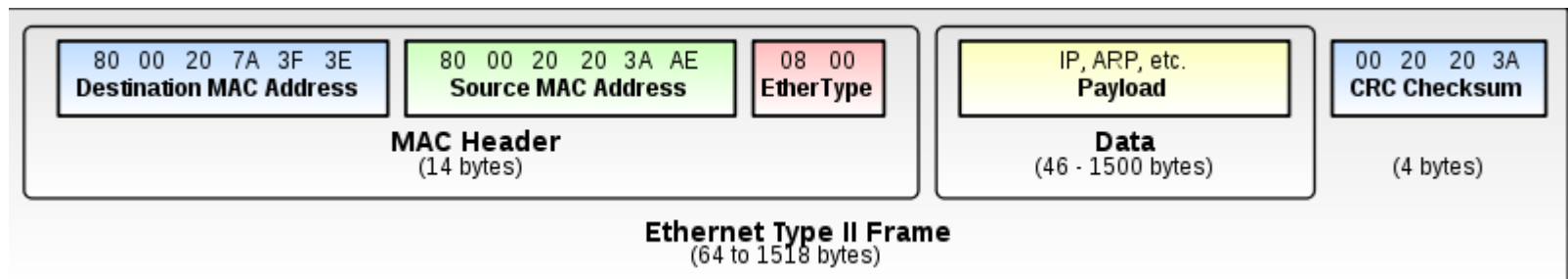
Ethernet

- Developed by Xerox 1973-1975
- CSMA/CD - Carrier sense multiple access with collision detection
- Standardization – IEEE 802. project
http://en.wikipedia.org/wiki/IEEE_802
- Varieties of Ethernet
<http://en.wikipedia.org/wiki/Ethernet>

Ethernet Frame

802.3 MAC Frame

Preamble	Start-of-Frame-Delimiter	MAC destination	MAC source	802.1Q header (optional)	EtherType/Length	Payload (Data and padding)	CRC32	Interframe gap
7 octets of 10101010	1 octet of 10101011	6 octets	6 octets	(4 octets)	2 octets	46–1500 octets	4 octets	12 octets
						64–1522 octets		
						72–1530 octets		
						84–1542 octets		

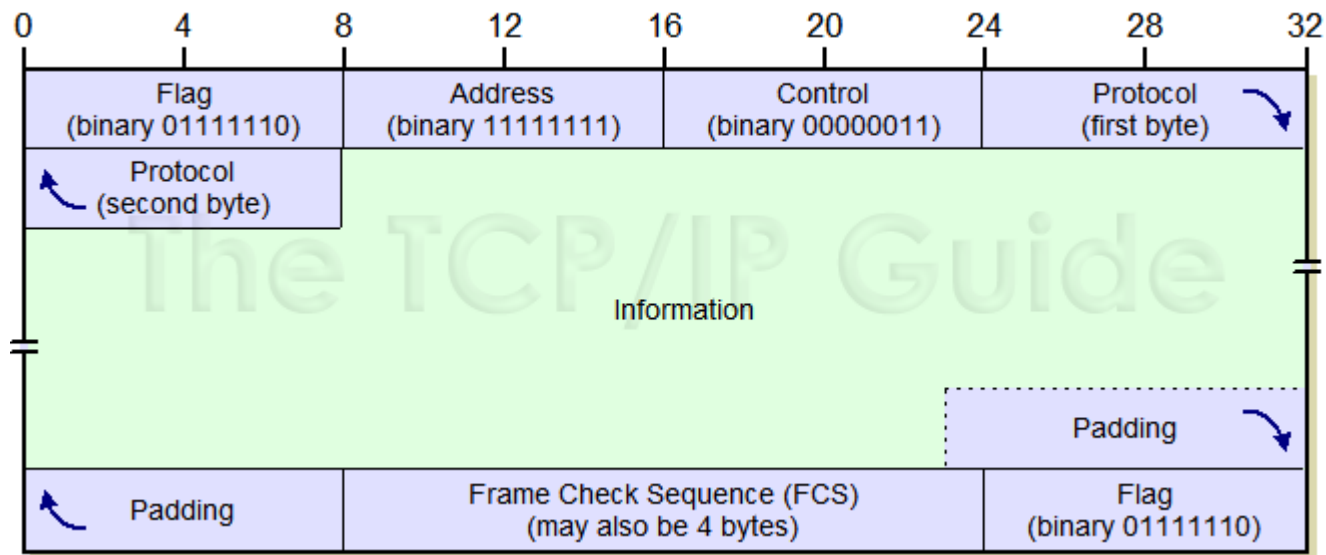


Efficiency = Payload/Frame size > 97 %

Point to Point Protocol - PPP

- **PPP** is used over many types of physical networks including serial cable, phone line, trunk line, cellular telephone, specialized radio links, and fiber optic links such as SONET. Most Internet service providers (ISPs) use PPP for customer dial-up access to the Internet. Two encapsulated forms of PPP, Point-to-Point Protocol over Ethernet (PPPoE) and Point-to-Point Protocol over ATM (PPPoA), are used by Internet Service Providers (ISPs) to connect Digital Subscriber Line (DSL) Internet service.
- **Link Control Protocol (LCP)** is an integral part of PPP, and is defined in the same standard specification. LCP provides automatic configuration of the interfaces at each end (such as setting datagram size, escaped characters, and magic numbers) and for selecting optional authentication.
- **Configuration options**
 - Authentication – PAP, CHAP, EAP
 - Compression
 - Error detection
 - Multilink

PPP frame



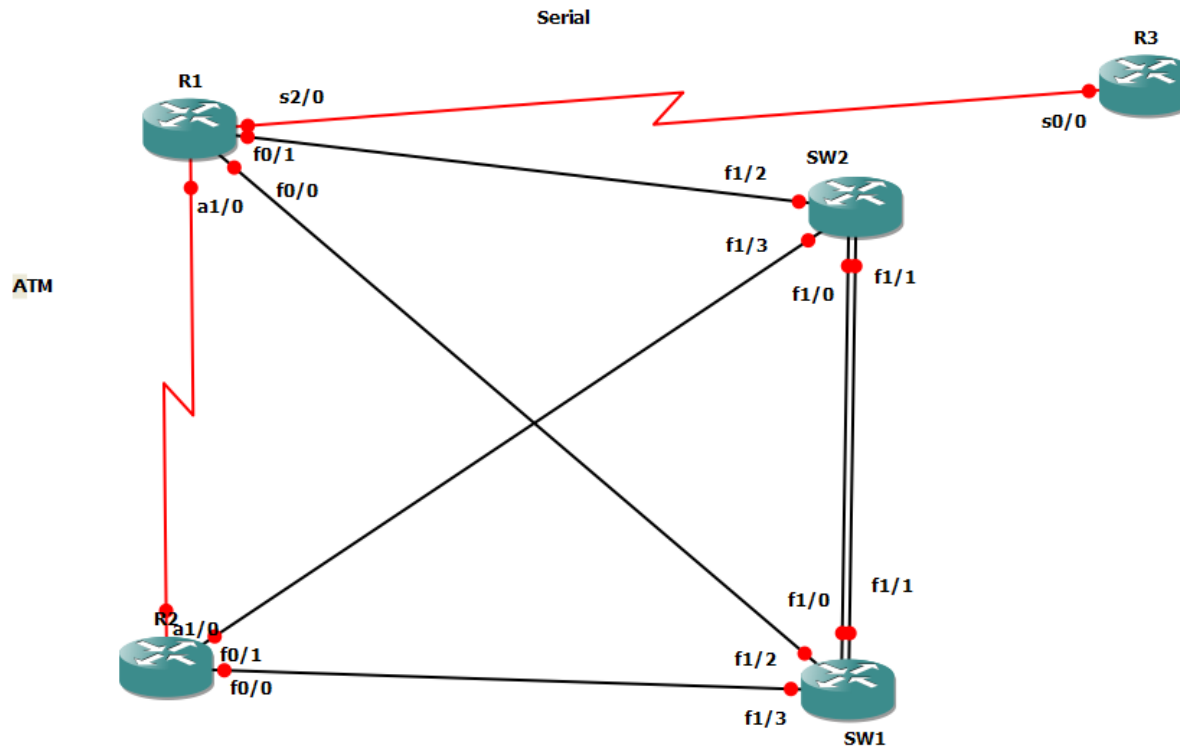
Frame relay



Работа с мрежови симулатор и с трафичен снифер

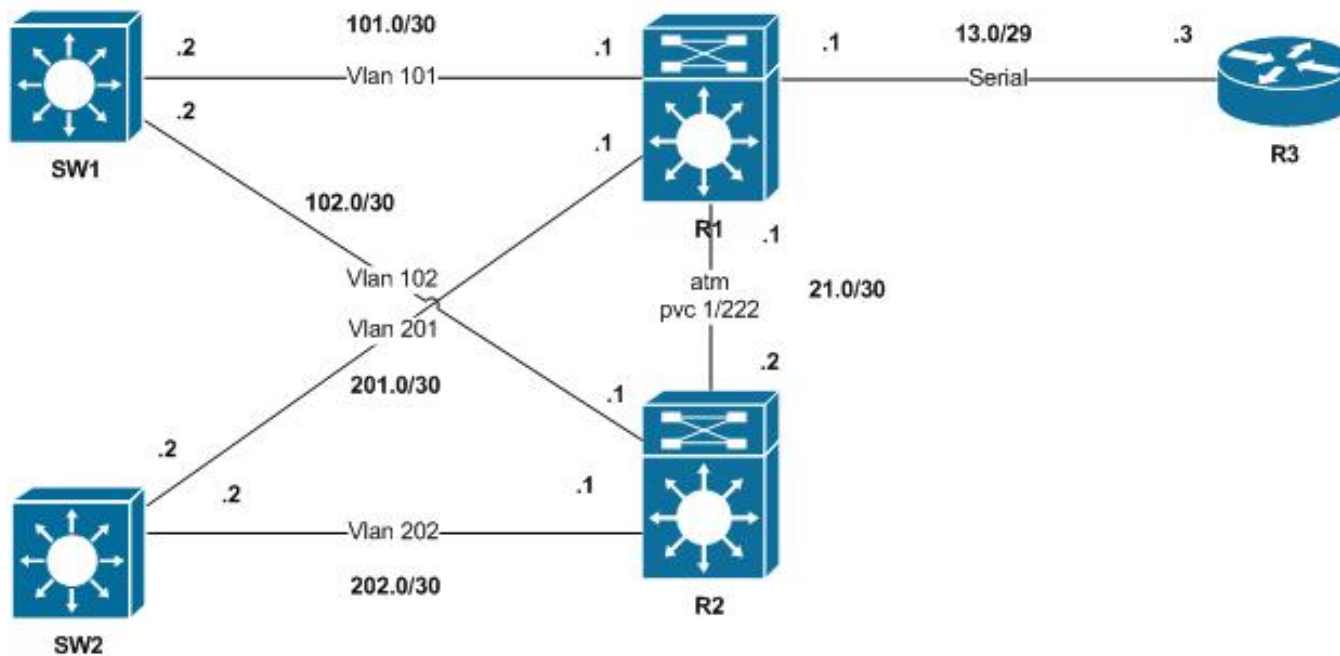
- <http://7200emu.hacki.at/>
- Dynagen <http://dynagen.org/tutorial.htm>
- Graphical Network Simulator
<http://www.gns3.net/>
- Wireshark www.wireshark.org

Физическа Топология



Логическа Топология

20.2/16 Network



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Мрежи за достъп от следващо поколение

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