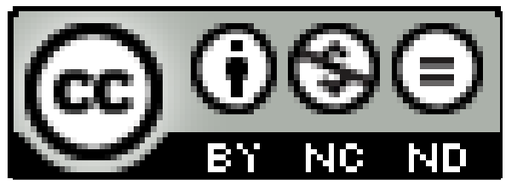
Мрежова сигурност I

http://training.iseca.org/

IPv6



Boyan Krosnov

IPv6

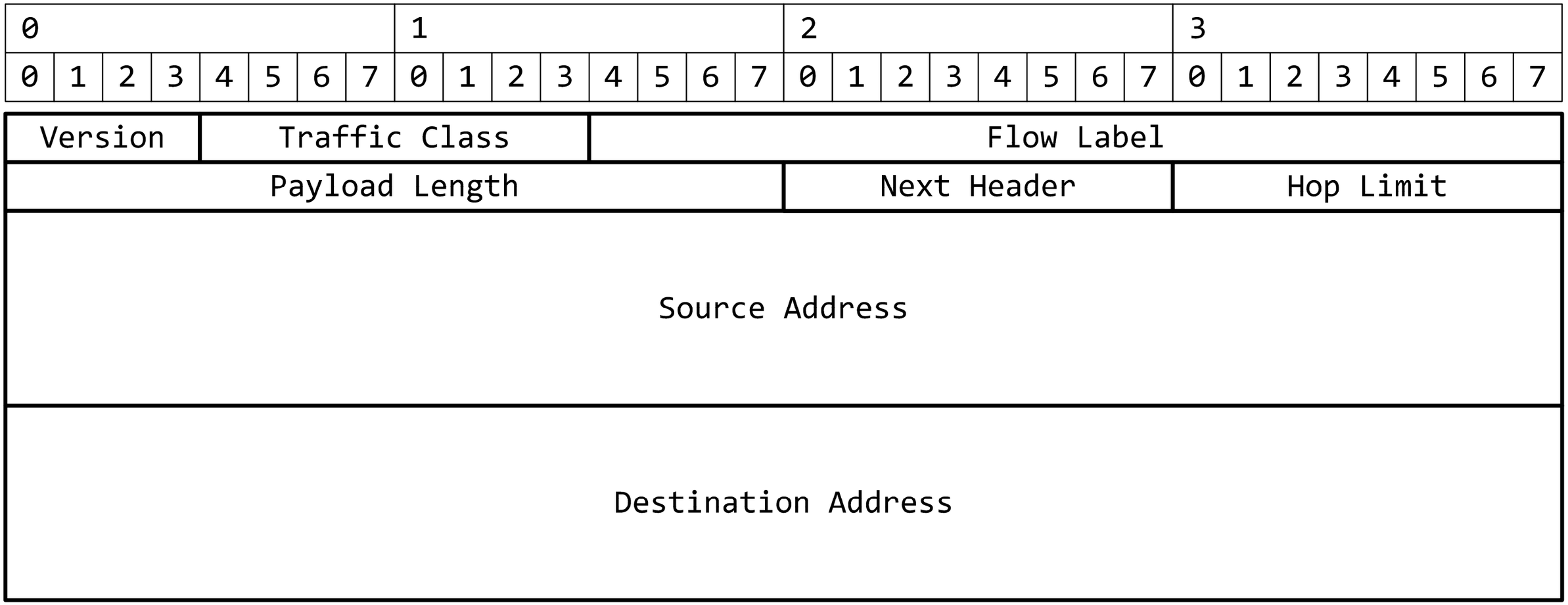
- IPv6 header, разлики от v4
- Адресиране
  - Unicast, Anycast, Multicast
  - Scopes
- Опции (extension headers)
- Neighbour Discovery
- Stateless Address Autoconfiguration
- DHCPv6

- Атаки

Стандарта

- RFC 2460
  - RFC5095: Deprecation of Type 0 Routing Headers in IPv6
  - RFC5722: Handling of Overlapping IPv6 Fragments
  - RFC5871: IANA Allocation Guidelines for the IPv6 Routing Header
- Други RFC-та за ND, SLAAC и др.

IPv6 header



- Обичайните полета – Source, Destination, Next Header (protocol), Payload Length
- Известни от v4 – Version, Hop Limit (TTL), Traffic Class
- Нови – Flow Label

IPv4 Header Format

Version	IHL	Type of Service	Total Length	
Identification			Flags	Fragment Offset
Time To Live (TTL)		Protocol	Header Checksum	
Source Address				
Destination Address				
Options				Padding

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Version	Traffic Class	Flow Label
Payload Length	Next Header	Hop Limit
Source Address		
Destination Address		

IPv6 Header Format

IPv4 Header Format

Version	~~IHL~~	Type of Service	Total Length
~~Identification~~		Flags	~~Fragment Offset~~
Time To Live (TTL)	Protocol	~~Header Checksum~~	
Source Address			
Destination Address			
Options			~~Padding~~

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Version	Traffic Class	Flow Label
Payload Length	Next Header	Hop Limit
Source Address		
Destination Address		

IPv6 Header Format

Адреси

- RFC4291
- 128 бита
- Как се записват

- Unicast, Anycast, Multicast

- (interface/node scope)
- Link-local scope
- (admin scope)
- (site scope)
- (organization scope)
- Global scope

Записване на v6 адреси

```
2001:DB8:0:0:8:800:200C:417A   a unicast address
FF01:0:0:0:0:0:0:101           a multicast address
0:0:0:0:0:0:0:1                the loopback address
0:0:0:0:0:0:0:0                the unspecified address
0:0:0:0:0:FFFF:129.144.52.38
```

may be represented as

```
2001:DB8::8:800:200C:417A      a unicast address
FF01::101                      a multicast address
::1                            the loopback address
::                             the unspecified address
::FFFF:129.144.52.38
```

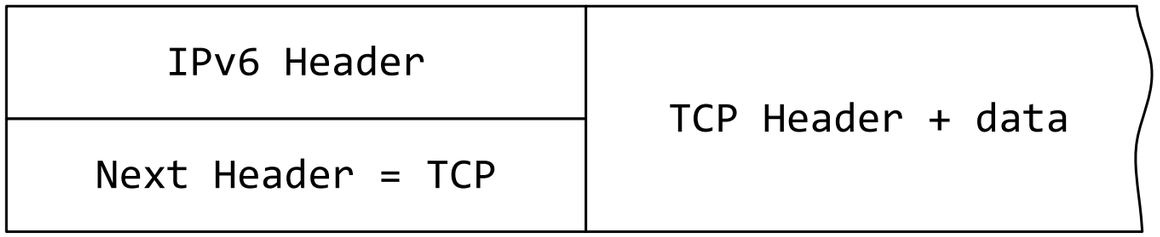
Адреси

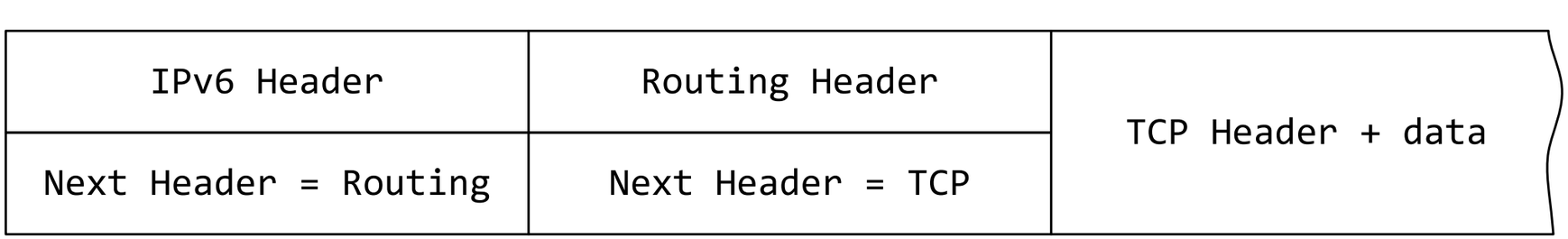
- 0000::/8 - Loopback
- ::FFFF:0:0/96 – IPv4-mapped IPv6 (dual stack)
- 2000::/3 - Global Unicast
  - /32 за всеки LIR
  - /48 или /56 client/site
  - /64 subnet
- FC00::/7 - Unique Local Unicast
- FE80::/10 - Link Local Unicast
- FF00::/8 - Multicast

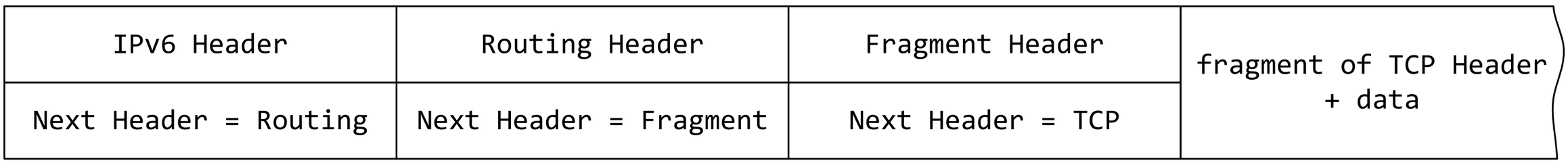
Extension Headers

- IPv6 header
- Hop-by-Hop Options header
- Destination Options header
- Routing header
- Fragment header
- IPSec
  - Authentication header
  - Encapsulating Security Payload header
- upper-layer header

Extension Headers







Neighbour Discovery Protocol

- RFC4861
- ICMPv6
- multicast/unicast
- Layer 2 address resolution
  - Find MAC address from IP address
  - като ARP
- Duplicate address
  - като Gratuitous ARP
- Configuration
  - Learn all local prefixes
  - Recursive DNS advertisement
- Redirects

Stateless Address Autoconfiguration

- RFC4862
- Generate link-local address
- Duplicates check (ND)
- Assign Link-local address

- Listen for Router Advertisements (ND)
  - Global prefix
  - Router address, L2 address
  - MTU
  - Initial TTL
  - Managed/other

Прехода

- 6to4
  - 192.88.99.1
  - 2002::/16
- Teredo
  - 2001::/32
  - well known v4 server addresses
- ISATAP
  - v4 като link-layer

Въпроси

Следващия път

- Увод в мрежовата сигурност
- Криптография
- Увод в мрежите
- Ethernet
- Wi-Fi
- IP
- UDP, DHCP, ARP, Атаки върху IP
- IP routing protocols, IPv6

→ **TCP**

- Лекция преговор
- Тест –18-ти Ноември
- Демо
- …