Cvicenie09

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Adresovanie a subsieťovanie v IPv6 sieťach, protokoly ICMPv4, ICMPv6, ARP

Úloha 1: Adresácia v IPv6 [editovat]

- •
- preved'te nasledujúce IPv6 adresy do ich skráteného formátu:
 - FE80:E001:0002:003F:EF00:0000:ABCD:1234
 - 2001:AA34:0000:0000:FE01:DCBA:4321
 - FF00:CD01:0000:0000:AB45:0000:0000:00AB
- identifikujte IPv6 adresy ich formát, rôzne typy a ich význam
 - unicast (link-local, global)
 - multicast (assigned, solicited node)
 - o anycast
- popíšte procesy RS/RA a NS/NA
 - ktorý protokol sa používa v oboch týchto procesoch na posielanie tohto typu správ?
 - o

Úloha 2: Analýza ICMPv6 správ RS/RA, NS/NA vo Wiresharku [editovat]

V tejto úlohe sa využíva protokolový stack nad IPv6 - TCP/IPv6. Ak na počítači nie je aktivovaný TCP/IPv6, tak sú potrebné administrátorské práva na danom PC, na ktorom sa pracuje, pre jeho aktiváciu/povolenie (študenti na školských PC nie sú s admin právami). Viditeľné potom ale budú pravdepodobne aj tak iba správy typu RS - Router Solicitation). Ukážku však môže spraviť učiteľ, ak je v danej učebni ako admin na učiteľskom PC, alebo študent pripojený cez wifi sieť na vlastnom notebooku, kde je ako správca on. Alternatívne, sa dajú použiť screen shoty, ktoré sme priložili s odchytaných ICMPv6 správ z Wiresharku.

• Wireshark sniff: ICMPv6

- zapnite odchytávanie a dajte si filter na ICMPv6 protokol (do filtra vo Wiresharku malým: icmpv6), alebo NDP
- aby ste vyvolali komunikáciu IPv6 treba protokol IPv6 najprv vypnúť (a dať OK) a potom zapnúť (a dať OK) (Ovládací panel - Centrum sietí -Zmeniť možnosti adaptéra - PMyš - Vlastnosti - vypnúť/ zapnúť Protokol TCP/IPv6)

 Nastavenia Domov Vvhľadať nastavenie 	Ovládací panel - Centrum sietí - Zmeniť možnosti adaptéra - PMyš - Vlastnosti - vypni Protokol TCP/IPv6, OK a potom zapni Protokol TCP/IPv6 • WireShark zachvtí IPv6 pakety Súvisiace nastavenia	à
- ymddae nastavenie	Zmeniť možnosti ad	laptéra
Sieť a internet	Sietové pripojenia	
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🖫 Ethernet	Ethernet	
ଳ Telefonické pripojenie	Wirf Vypnúť Stav Sieť	
% VPN	Pripojiť pomocou:	
Proxy	Vytvoriť otkaz Vytvoriť otkaz Odstrániť Odstrániť Premenovať V lastnosti Ulastnosti LOP Prokol TCP/IPv4 (Internet Protocol Version 4) Microsoft LLOP Protocol TDeroto Oliver Valupno-výstupný ovládač mapovača zistovania topolčy Livorne i v Valupno-výstupný ovládač mapovača zistovania topolčy Livorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Valupno-výstupný ovládač mapovača zistovania topolčy i vorne i v Popís	
	OK Zušť	

preskúmajte správy:

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- Router Solicitation, Router Advertisement
 - stačí keď v nastaveniach siete pre IPv6 rozhranie na PC nastavíte statické prideľovanie adries a následne ho hneď zmeníte na dynamické (aby sme vyvolali proces bezstavovej autokonfigurácie IPv6 adresy a videli správy RS a RA)
- Neighbor Solicitation, Neighbor Advertisement

- Najprv preskúmajte obsah tabuľky susedov pre IPv6 rozhranie (ako ARP tabuľka v IPv4):
 - použite príkaz v príkazovom riadku:
 - CMD> netsh CMD> netsh> interface ipv6 CMD> netsh interface ipv6> show neighbors

Potom skúste ping na niektorého suseda (na jeho IPv6 adresu), pred tým ale spustite nové odchytávanie cez Wireshark, filter na ICMPv6 (alebo NDP)

Preskúmajte obsah NS a NA správ

Poznámka pre učiteľa: vo Wiresharku sa môže objaviť okrem ICMPv6 aj MLD protokol ktorý sa prenáša ako časť (jeden z typov) ICMPv6 protokolu.

- Ako cieľ sa používa multicast IPv6 adresa FF02::16 == All MLDv2-capable routers.
- viac info je možné nájsť tu: Multicast Listener Discovery Protocol (IPv6 Multicasting) (what-when-how.com)
- alebo priamo v RFC 3810 RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6 (ietf.org)

Screen shoty z Wiresharku, ktoré je možné analyzovať na cvičení, ak v živej sieti nebude možné odchytiť žiadne ICMPv6 správy:

1. RS/RA proces

ukážka 1: smerovač neponúkol žiadny prefix, ani on sám nemá na svojom rozhraní žiadnu global unicastovú adresu, iba link-local adresu fe80::1

Router Solicitation (host -> router):

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  ...09:37:... fe80::5019:1934:5e73:5209 ff02::2 ICMPv6 62 Router Solicitation
  ...09:37:... fe80::5019:1934:5e73:5209 ff02::16 ICMPv6 150 Multicast Listener Report Message v2
  ...09:37:... fe80::1
                                        ff02::1 ICMPv6 118 Router Advertisement from 6c:20:56:bd:f3:50
             £-00...F010.1024.F-72.F200 ££02..1C
                                                     TOMP
Frame 8336: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface 0
Ethernet II, Src: Micro-St_de:3a:be (8c:89:a5:de:3a:be), Dst: IPv6mcast_02 (33:33:00:00:00:02)
Internet Protocol Version 6, Src: fe80::5019:1934:5e73:5209, Dst: ff02::2
  0110 .... = Version: 6
 > .... 0000 0000 .... .... ... ... = Traffic Class: 0x00 (DSCP: CS0, ECN: Not-ECT)
   .... .... 0000 0000 0000 0000 0000 = Flow Label: 0x00000
  Payload Length: 8
  Next Header: ICMPv6 (58)
  Hop Limit: 255
  Source: fe80::5019:1934:5e73:5209
  Destination: ff02::2

    Internet Control Message Protocol v6

  Type: Router Solicitation (133)
  Code: 0
  Checksum: 0x636d [correct]
  [Checksum Status: Good]
  Reserved: 00000000
```

Router Advertisement (router -> host)

 Image: Statistics
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 Image: Statistics
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 icmpv6 Time Source 9... fe80:::dc70:91f4:262f:5e94 ICMPv6 86 Neighbor Solicitation for fe80::1 from a4:4e:31:b4:fe:8c fe80::1 ICMPv6 78 Neighbor Advertisement fe80::1 (rtr, sol) ICMPv6 86 Router Advertisement from fc:e3:3c:be:0b:27 9... fe80::1 fe80::dc70:91f4:262f:5e94 1... fe80::1 ff02::1 Frame 18108: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface 0 Ethernet II, Src: HuaweiTe_be:0b:27 (fc:e3:3c:be:0b:27), Dst: IPv6mcast_01 (33:33:00:00:00:01) Internet Protocol Version 6, Src: fe80::1, Dst: ff02::1 Internet Control Message Protocol v6 Type: Router Advertisement (134) Code: 0 Checksum: 0xe44b [correct] [Checksum Status: Good] Cur hop limit: 64 Flags: 0x40, Other configuration, Prf (Default Router Preference): Medium Router lifetime (s): 1800 Reachable time (ms): 0 Retrans timer (ms): 0 ~ ICMPv6 Option (MTU : 1472) Type: MTU (5) Length: 1 (8 bytes) Reserved MTU: 1472 V ICMPv6 Option (Source link-layer address : fc:e3:3c:be:0b:27) Type: Source link-layer address (1) Length: 1 (8 bytes) Link-layer address: HuaweiTe_be:0b:27 (fc:e3:3c:be:0b:27)

v predošlej správe RA po rozbalení položky Flags, je vidieť príznaky M (managed)

```
a O (other):
    [Onecresum Status. 0000]
    Cur hop limit: 64
    Flags: 0x40, Other configuration, Prf (Default Router Preference): Medium
    0... ... = Managed address configuration: Not set
    .1. ... = Other configuration: Set
    .0. ... = Home Agent: Not set
    .0. 0... = Prf (Default Router Preference): Medium (0)
    ... 0.. = Proxy: Not set
    ... 0. = Reserved: 0
    Router lifetime (s): 1800
    Reachable time (ms): 0
```

Ukážka 2: smerovač ponúkol prefix

RS (nič nové, ako v predo	šlej	j ukážke)
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Ethernet				
Eile Edit Vie	w Go Capture Analyze Statistics Telephony Wireless Tools	Help		
▲ ≡ ₫ @				
icmpv6	-			
No. Time	50/ce	ff022	Protocol TCMDv/C	Legh int
	Teo0:::d4/5:0042:d020:Co25	11022	ICHPV6	62 ROULER SOLICITATION
	te80::a475:6b42:ab2b:c823	++02::16	ICMPv6	1Multicast Listener Report Message v2
	fe80::1	ff02::1	ICMPv6	1…Router Advertisement from 6c:20:56:bd:f3:50
¢				
> Frame	e 7353: 62 bytes on wire (4	96 bits), 62 bytes	captured	<pre>1 (496 bits) on interface \Device\NPF_{E4FBDF42-F985-4382-AC47-8BB25A9A364A}, id 0</pre>
Ether	net II, Src: ASUSTekC_89:c4	4:8c (70:4d:7b:89:0	:4:8c), [Dst: IPv6mcast_02 (33:33:00:00:00:02)
~ Inter	net Protocol Version 6, Sr	c: fe80::a475:6b42:	ab2b:c82	23, Dst: ff02::2
011	0 = Version: 6			
>	0000 0000	= Traffi	c Class:	AXAA (DSCP: CSA, ECN: Not-ECT)
	0000 0000 0000 0000 0000	- Flow Label: 0x00	000	
	. 0000 0000 0000 0000 0000	= 110W Label. 0x00	000	
Pay	Load Length: 8			
Nex	t Header: ICMPv6 (58)			
Нор	Limit: 255			
Sou	rce Address: fe80::a475:6b4	2:ab2b:c823		
Des	tination Address: ff02::2			
~ Inter	net Control Message Protoc	ol v6		
Typ	e: Router Solicitation (133	0		
Cod	a. 0	,		
Cha	alayma Ouf-2f [aannast]			
Che	cksum: Øxtazt [correct]			
[Ch	ecksum Status: Good]			
Res	erved: 00000000			

RA (smerovač ponúkol aj prefix)

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No. Time Source	Destination	Protocol	Length Info
7353 4 fe80::a475:6b42:ab2b:c823	ff02::2	ICMPv6	62 Router Solicitation
7354 4 fe80::a475:6b42:ab2b:c823	ff02::16	ICMPv6	130 Multicast Listener Report Message v2
7355 4 fe80::1	ff02::1	ICMPv6	118 Router Advertisement from 6c:20:56:bd:f3:50
7256 4 £000.00475.6642.0000	££001C	TOMPUC	00 Multicast Listonan Danant Massage v2
Frame 7355: 118 bytes on wire (944 bits) Ethernet II, Src: Cisco_bd:f3:50 (6c:20: Internet Protocol Version 6, Src: fe80:: Internet Control Message Protocol v6 Type: Router Advertisement (134) Code: 0 Checksum: 0xfe12 [correct]	, 118 bytes capt 56:bd:f3:50), Ds 1, Dst: ff02::1	ured (944 bits) o t: IPv6mcast_01 (n interface \Device\NPF_{E4FBDF42-F985-4382-AC47-8BB25A9A364A}, id @ 33:33:00:00:00:01)
[Checksum Status: Good]			
Cur hop limit: 64			
 > Flags: 0x40, Other configuration, Prf Router lifetime (s): 1800 Reachable time (ms): 0 Retrans timer (ms): 1000 > ICMPv6 Option (Source link-layer address (1) Length: 1 (8 bytes) Link-layer address: Cisco_bd:f3:50 (6 > ICMPv6 Option (MTU : 1500) 	(Default Router F ss : 6c:20:56:bd: sc:20:56:bd:f3:50	Preference): Mediu :f3:50)))	.m
Type: MTU (5) Length: 1 (8 bytes) Reserved MTU: 1500			
 ICMPv6 Option (Prefix information : 20) 	01:4118:300:121::	:/64)	
Type: Prefix information (3)		. ,	
Length: 4 (32 bytes)			
Prefix Length: 64			
Flag: 0xc0, On-link flag(L), Autonomo	us address-confi	guration flag(A)	
1 = On-link flag(L): Set		• • • •	
.1 = Autonomous address-conf	iguration flag(A)): Set	
<pre>0 = Router address flag(R):</pre>	Not set		
0 0000 = Reserved: 0			
Valid Lifetime: 2592000			
Preferred Lifetime: 604800			
Reserved			
Prefix: 2001:4118:300:121::			

2. NS/NA proces

Ukážka 1:

Neig	ghbor	Sol	licita	tion:
*Wi-Fi				

a with			
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icmpv6			
io. Time Source	Destination	Protocol	Length Info
5 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
9… fe80::1	fe80::dc70:91f4:262f:5e94	ICMPv6	134 Destination Unreachable (no route to destination)
9 fe80::dc70:91f4:262f:5e94	fe80::1	ICMPv6	86 Neighbor Solicitation for fe80::1 from a4:4e:31:b4:fe:8c
9 fe80::1	fe80::dc70:91f4:262f:5e94	ICMPv6	78 Neighbor Advertisement fe80::1 (rtr, sol)
1 fe80::1	ff02::1	ICMPv6	86 Router Advertisement from fc:e3:3c:be:0b:27
		+ (coo b	ita) an inta face o
> Frame 14555: 86 bytes on wire (6	saa bits), aa bytes captured		its) on interface 6
> Ethernet II, Src: IntelCor_b4:+0	2:80 (a4:4e:31:04:Te:80), Ds	sτ: Huaw	eile_be:00:27 (fc:e3:3c:be:00:27)
> Internet Protocol Version 6, Sr	c: +e80::dc/0:91+4:262+:5e94	i, Dst:	te80::1
 Internet Control Message Protoco 	ol v6		
Type: Neighbor Solicitation (1	.35)		
Code: 0			
Checksum: 0xb466 [correct]			
[Checksum Status: Good]			
Reserved: 00000000			
Target Address: fe80::1			
 ICMPv6 Option (Source link-lay 	/er address : a4:4e:31:b4:fe	:8c)	
Type: Source link-laver addr	ess (1)		
Length: 1 (8 bytes)			
link-laver address: IntelCor	b4:fe:8c (a4:4e:31:b4:fe:8	c)	
		- /	

Neigbor Advertisement:

"Wi-Fi			
ile Edit View Go Capture Analyze Statistics Telephony V	Vireless Tools Help		
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icmpv6			
o. Time Source	Destination	Protocol	Length Info
3 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
3 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
3 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
3 fe80::1	fe80::dc70:91f4:262f:5e94	ICMPv6	134 Destination Unreachable (no route to destination)
3 fe80::dc70:91f4:262f:5e94	ff02::1:ff00:1	ICMPv6	86 Neighbor Solicitation for fe80::1 from a4:4e:31:b4:fe:8c
3… fe80::1	fe80::dc70:91f4:262f:5e94	ICMPv6	86 Neighbor Advertisement fe80::1 (rtr, sol, ovr) is at fc:e3:3c:be:0b:27
5 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
5 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
5 fe80::dc70:91f4:262f:5e94	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
Frame 4554: 86 bytes on wire (68 Ethernet II, Src: HuaweiTe_be:00 Internet Protocol Version 6, Src Internet Control Message Protoco	<pre>18 bits), 86 bytes captured 5:27 (fc:e3:3c:be:0b:27), Ds 11 fe80::1, Dst: fe80::dc70; 12 v6</pre>	(688 bit st: Intel :91f4:262	s) on interface 0 Cor_b4:fe:8c (a4:4e:31:b4:fe:8c) f:5e94
Type: Neighbor Advertisement (Code: 0	136)		
Checksum: 0x622c [correct]			
[Checksum Status: Good]			
Y Flags: 0xe0000000, Router, Sol	icited. Override		
1	= Router: Set		
.1	= Solicited: Se	+	
1	= Override: Set	-	
A AAAA AAAA AAAA AAAA AAAA	A AAAA AAAA = Reserved: A		
Tanget Address: fe80::1	b bbbb bbbb - Reserved. b		
TCMPy6 Option (Tanget link-law	an address , fs:a2:2s:ba:Ab		
Type: Tanget link-layon addn			
longth: 1 (2 hutes)	233 (2)		
Link leven address, HususiTe	hav@hv27 (fava2v2avhav@hv2)	7)	
Link-layer address: Huaweile	_be:00:27 (+c:es:sc:be:00:2	/)	
Ukážka 2:			

NS

Ethernet			
Edit View Go Capture Analyze Statistics Telephony Windows Tools Help			
Time Source	Desthation	Protocol	Length Info
/399 4 te80::1	fr02::1:ffc5:95c8	ICMPV6	86 Neighbor Solicitation for 2001:4118:300:121:4945:3315:Dic5:9568 from 6c:20:56:Dd:f3:50
7400 4 2001:4118:300:121:4946:a315:01c5:95c8	fe80::1	TCMPV6	86 Neighbor Advertisement 2001:4118:300:121:4946:3315:D105:9508 (Sol, OVr) 1s at 70:4d:7D:89:
ame 7399: 86 bytes on wire (688 bits), 86 bytes hernet II, Src: Cisco_bd:f3:50 (6c:20:56:bd:f3: tannet Bestace) Version 6 Spc: f680:11 Dct: f	captured (688 bit 50), Dst: IPv6mcas	s) on int t_ff:c5:9	erface \Device\NPF_{E4FBDF42-F985-4382-AC47-8B825A9A364A}, id 0 5:c8 (33:33:ff:c5:95:c8)
Allo - Version 6, Src: Te80::1, DSC: T	102::1:1105:9508		
1110 = Version: 6	Class: Avea (DS)	CD: CS7 1	ECN: Not_ECT)
0000 0000 0000 0000 0000 = Flow Label: 0x00	2000	CF. C3/, I	
Pavload Length: 32			
Next Header: ICMPv6 (58)			
Hop Limit: 255			
Source Address: fe80::1			
Destination Address: ff02::1:ffc5:95c8			
nternet Control Message Protocol v6			
Type: Neighbor Solicitation (135)			
Code: 0			
Checksum: 0x953c [correct]			
[Checksum Status: Good]			
Reserved: 00000000			
TCMPy6 Ontion (Source link-laver address : 6c:20	3:56:bd:f3:50)		
Type: Source link-layer address (1)	5.50.00.15.50)		
Length: 1 (8 bytes)			
Link-laver address: Cisco bd:f3:50 (6c:20:56:h	d:f3:50)		
IA			
JA Intel Intel Sector Backets Magney (Sector Sector Back Intel Intel Sector Sector Intel I			
IA News L (1) (10) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2			
IA Ment In the for Center glodyn Josian Meghang gloden Josh (se) I d the for Center glodyn Station Meghang gloden Josh (se) et the force 7309 dL frage: 1	Cessulon Ff62::1:ffc5:95c8	Protocol TCMPy/6	سمس که Re Neighbor Solicitation for 2001:4118:300:121:4046:a315:b1c5:95c8 from 6c:20:56:bd:f3:50
Horn To So Contro Jondon Josés Voyang Direce José Belo To So Contro Jondon José Direce José Belo To So Contro José Direce	Constants Ff02::1:ffc5:95c8 fe80::1	Pretocal ICMPv6 ICMPv6	<pre>.wep .We 86 Neighbor Solicitation for 2001:4118:300:121:4946:a315:b1c5:95c8 from 6c:20:56:bd:f3:50 86 Neighbor Advertisement 2001:4118:300:221:4946:a315:b1c5:95c8 (sol, ovr) is at 70:4d;7b:89:c4</pre>
Mont 1 yer & Cyther Andre Settins Maphray 1004 104 104 1 ⊕ 2 ⊕ 2 ⊕ 4 ⊕ 4 ⊕ 2 ± 1 1 ⊕ 2 ⊕ 2 ⊕ 1 ⊕ 1 ± 2 ± € € € € ⊈ ± 1 T400 4 ↓ 2001:4118:300:121:4946:a315:b1c5:95c8 74:04 4 ⊕ 2001:4118:300:121:4946:a315:b1c5:95c8	Domain ff02:11:ffc5:95c8 fe80:11:ffc0:2	Protocol ICMPv6 ICMPv6 TCMPv6	المعرفة المعرفة 68 Neighbor Solicitation for 2001:4118:300:121:4946:a315:b1c5:95c8 (sol, ovr) is at 70:4d:7b:89:c4 29 Noighbor Advertisement 2001:4118:2001:131:4946:a315:b1c5:95c8 (sol, ovr) is at 70:4d:7b:89:c4
A term The Source T 399 4. Fe88:11 T 490 4. 2001:4118:300:121:4946:3315:b15:95c8 T 410 4. 2001:4118:300:121:4946:385 T 410 4. 2001:4118:300:121:4946 T 410 4. 2001:4118:40 T 410 4. 2001:4118 T 410 4. 2001:418 T 410 4. 2001 T 410 4. 2001 T 410 4.	Constant ff02:11:ffc5:95c8 fe80:1 ff00:16000 captured (688 bits	Protocol ICMPv6 ICMPv6 TCMPvc ;) on inte	<pre>Legn Mo 66 Neighbor Solicitation for 2001:4118:300:121:4946:a315:b1c5:95c8 from 6c:20:56:bd:f3:50 66 Neighbor Advertisement 2001:4118:300:121:4946:a315:b1c5:95c8 (sol, ovr) is at 70:4d:7b:89:c4 90 Neighbor Calicitation for 2001:4118:200:121:4946:a315:b1c5:95c8 (sol, ovr) is at 70:4d:7b:89:c4 fface (Device(NPF_[E4FB0F42-F985-4322-AC47-888259A356A4}, id 0</pre>
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Úloha 3: Subsieťovanie v IPv6 v rámci SubnetID, konfigurácia IPv6 adries, analýza ICMPv6 správ RA, RS, NA, NS v Packet Traceri [editovať]

Táto úloha je bodovaná DÚ, odovzdáva sa súbor pka na Moodle do nedele pol noci, kedy bola úloha zadaná.

Pri spúšťaní aktivity do User profile - Name zadajte svoje: **Priezvisko_Meno** (bez diakritiky), e-mail: **login@stud.uniza.sk** (zadajte váš študentský e-mail), Additional info: **2023** (zadajte aktuálny rok), inak vám riešenie neuznáme.

- Topológia: PIKS_LAB_09.3_addressing_and_subnetting_IPv6_2023_03_16_topol ogy.pka
- Inštrukcie:
 - o V
 - slovenčine: PIKS_LAB_09.3_addressing_and_subnetting_IPv6_SK_2023_03
 _16_instructions.docx
 - o V

angličtine: PIKS_LAB_09.3_addressing_and_subnetting_IPv6_EN_2023_03 _16_instructions.docx

Súhrn toto, čo vás čaká v tejto úlohe (konkrétne zadanie máte v priloženom Word dokumente vyššie):

- subsieťujte daný IPv6 rozsah 2001:DB8:ACAD:00C0::/60 podľa požiadavky na 5 podsietí
 - napíšte adresy prvých piatich podsietí a vyberte prvú IPv6 adresu z každej subsiete pre rozhrania smerovačov
- na rozhraní gi0/0 na smerovači R1:
 - zapnite príkazom ipv6 enable podporu pre IPv6
 - odsledujte ako si smerovač po zadaní tohto príkazu, nastaví bezstavovou konfiguráciou link-local IPv6 adresu (show ipv6 interface brief)
 - ako si smerovač vyplnil Interface ID? Akým spôsobom? Pozrite sa na MAC adresu daného rozhrania (show interface g0/0)
 - zmeňte túto automaticky konfigurovanú link-local adresu na adresu: FE80::1 (ipv6 address ... link-local)
 - nakonfigurujte teraz aj IPv6 adresu typu global unicast pre rozhranie g0/0 z daného rozsahu (z časti subsieťovanie)
- na rozhraní s0/0/0 na smerovači R1:
 - nakonfigurujte teraz aj IPv6 adresu typu global unicast pre rozhranie s0/0/0 z daného rozsahu (z časti subsieťovanie)
 - konfiguráciu overte príkazom show ipv6 interface brief
 - odsledujte aj to, akú link-local adresu dostalo toto rozhranie automatickou konfiguráciou (show ipv6 interface brief)
 - zmeňte túto automaticky nakonfigurovanú link-local adresu na adresu: FE80::1 (ipv6 address ... link-local)

- rovnakým postupom (ako v predošlom bode pre s0/0/0 na R1) nakonfigurujte global unicast aj link-local adresy na sériovom porte R1 (FE80::1) aj na všetkých portoch na R2 (link-local adresy na každom rozhraní R2 nastavte na FE80::2)
- Prepnite sa v PT do simulačného režimu.
- Na počítači PC 1 nastavte IPv6 bezstavovou konfiguráciou (Desktop -> IP Configuration: Auto Config)
 - Odsledujte ako PC1 pošle správu ICMPv6 Router Solicitation na adresu FF02::2 (aký je toto multicast?)
 - Použite Capture/Forward...
 - Odsledujte ako smerovač odpovie správou ICMPv6 Router Advertisement na adresu FF02::1 (aký je toto multicast), v ktorej oznamuje počítaču prefix siete (nájdite ho v tele ICMPv6)
 - Overte, že PC1 si nastavil bezstavovou konfiguráciou adresu s prefixom od smerovača. Ako si doplnil Interface ID? (Modified EUI-64)
 - pre overenie použite príkaz ipv6config /all
- Predošlý krok (z PC1) zopakujte pre všetky ostatné počítače
- Stále ste v Simulačnom režime.
- Z PC1 pingnite P2 a odsledujte komunikáciu:
 - správy na PC1 pre zistenie neznámej MAC adresy pre IPv6 adresu default gateway R1
 - odsledujte správy ICMPv6 Neighbor Solicitation, a ICMPv6 Neighbor Advertisement (ako ARP v IPv4)
 - poslanie ICMPv6 Echo Requestu z PC1 na R1
 - správy na R1 pre zistenie neznámej MAC adresy pre IPv6 adresu PC2
 - odsledujte správy ICMPv6 Neighbor Solicitation, a ICMPv6 Neighbor Advertisement (ako ARP v IPv4)
 - poslanie ICMPv6 Echo Requestu z R1 na PC2
 - podobne odsledujte aj odpoved' ICMPv6 Echo Reply z PC 2 na R1 a d'alej na PC1 (pozor v tomto smere PT zle zobrazuje ICMPv6 NS a NA tie už tu nie sú potrebné - v realite by sa to nedialo.)

Pre učiteľa (poznámka k 9.3):

 krok1a - vo filtri nepotrebujeme v PT v simulačnom režime filter na ICMPv6, stačí zaškrtnúť NDP, program PT zobrazuje ICMPv6 v rámci NDP (Neighbour Discovery Process). Extra rozdiel by to ale robiť nemuselo, pre každý prípad sme v aktivite ponechali filter na oba protokoly.

Poznámka ku konfigurovaniu PT keď nepripočítava body za príkaz "username R1MACaddressG0/0 ..."

 Môže sa stať, že pri zadávaní príkazu urobíte preklep (napíšete veľkým ...Add...), a potom keď príkaz opakujete správne, nepripočíta bod. Riešením je zobraziť si konfiguráciu "sh run", odobrať chybné príkazy "no username ..." a pridať správny príkaz. Poučenie - **konfiguráciu udržujte "upratanú"**, bez nepotrebných alebo chybných príkazov.

• Dajte si pozor aj na veľké a malé písmená, zadávanie reťazcov v príkaze: username password je CASE SENSITIVE