

**CARNet**

HRVATSKA AKADEMСКА I ISTRAŽIVAČKA MREŽA

# Multikast u CARNet mreži

## Multikast usluga u CARNet mreži

.....  
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..... 22. Studeni 2006.

## Što je multikast ?

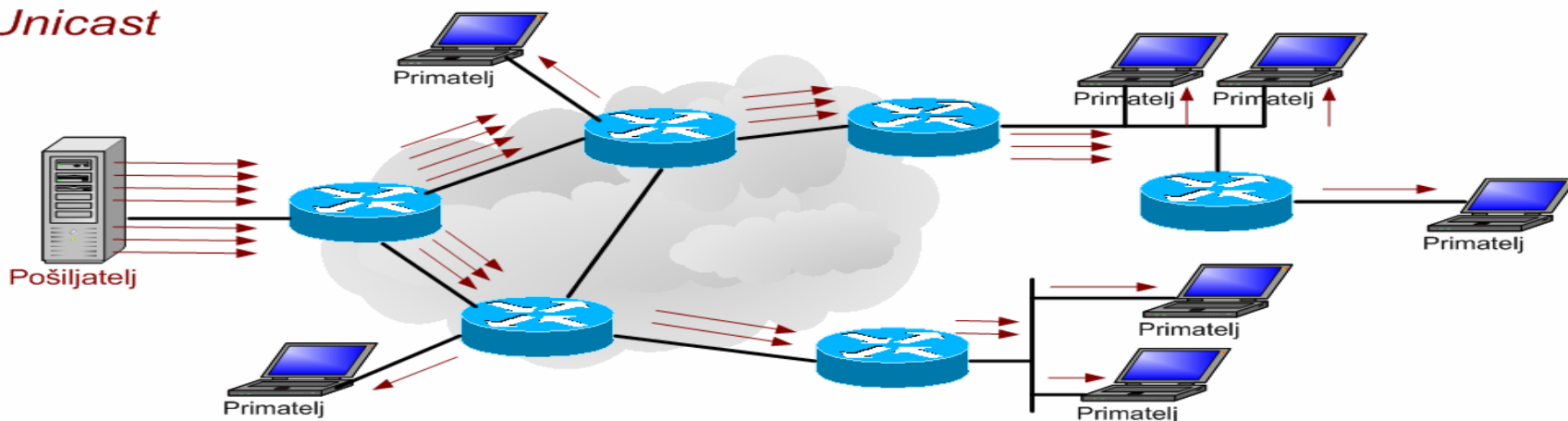
- Proširenje osnovne IP usluge
- Jedan paket na više odredišta (*“jedan za sve”*)
- D klasa IP adresa (224.0.0.0 do 293.255.255.255)
- UDP datagrami
- Multiplikaciju paketa obavlja usmjeritelj, a ne pošiljatelj (server)

## Zašto multikast?

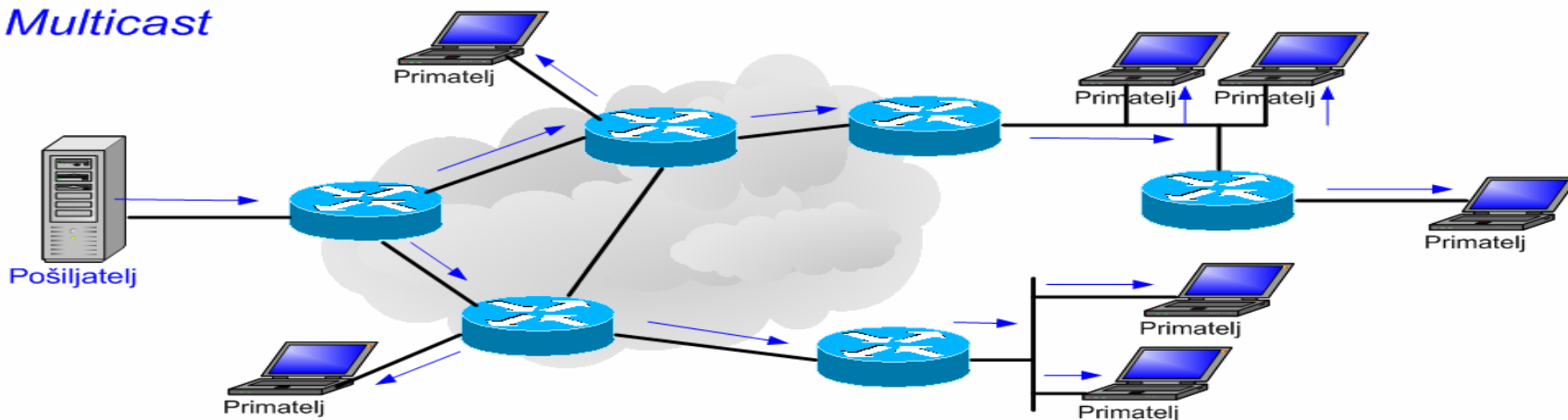
- ▶ Omogućen lakši pristup višemedijskim sadržajima
  - ▶ iRTV
  - ▶ MOD
  - ▶ Videokonferencije
  - ▶ Internet prijenos
  - ▶ .....
  
- ▶ Povećava dimenziju iskorištenosti već postojećih višemedijskih sadržaja
  
- ▶ Rasterećuje mrežu i poslužitelje

## Koncept multikast usluge

### Unicast

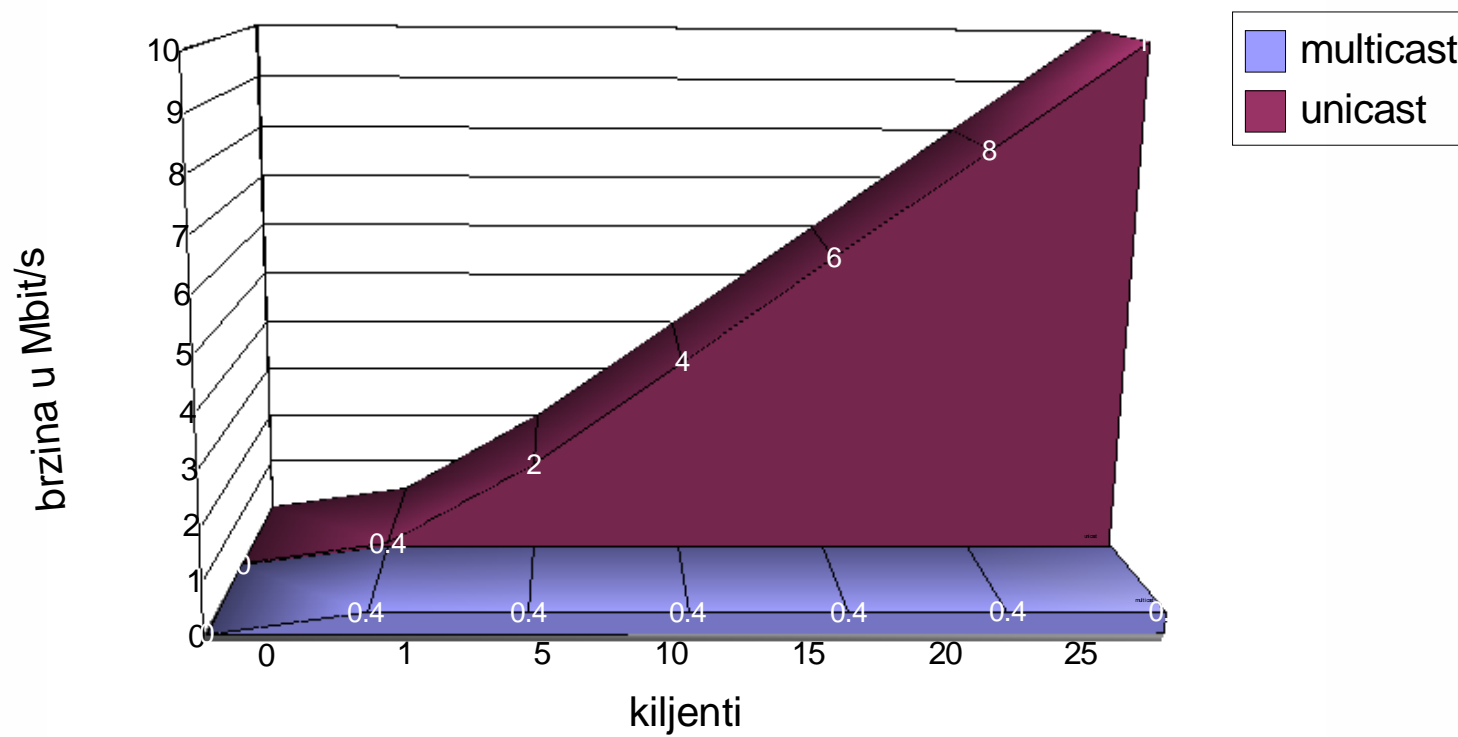


### Multicast



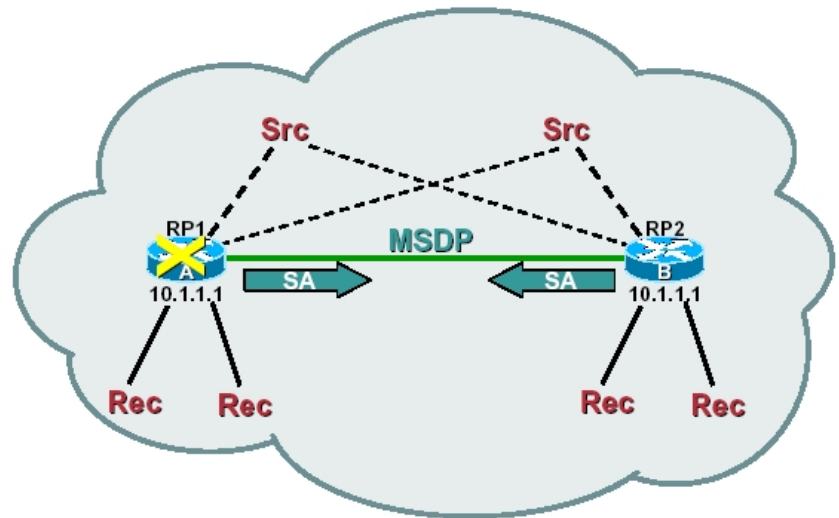
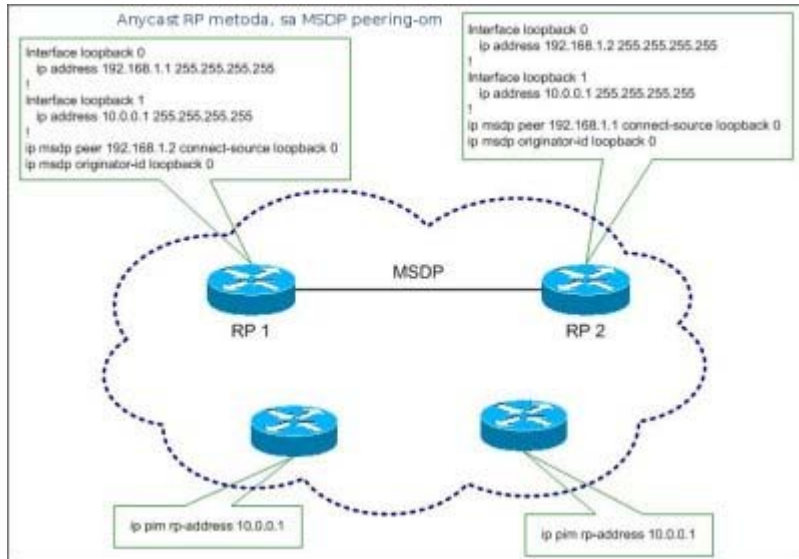
# Prednost multikast prijenosa

Primjer: Video stream od 0,4 Mbit/s



# Implementirane multikast tehnologije (protokoli)

- PIM-SM (Protocol Independent Multicast - Sparse Mode)
- Anycast RP (redundancija i "load balancing")
- MSDP peering (Multicast Source Discovery Protokol)



# Multikast usluge u CARNet mreži

- **Videokonferencije**
- **Internet prijenosi**
- **Nadzor mreže**
- **Real time prijenos četiri televizijska programa**
  1. HTV1
  2. HTV2
  3. RTL
  4. NOV@ TV

# Prijenos uživo NOV@ TV

CARNet Bandwidth Meter - Firefox

File Edit View History Bookmarks Tools Help

http://bwm.carnet.hr/

Vasa IP adresa je:  
161.53.12.132  
**Download Upload**  
**Ping Traceroute**  
**CARNetTV**  
Statistika  
NetFlow  
Multicast  
Napomena

**CARNet**

CARNet TV

Pravila igre na [www.dnevnik.hr](http://www.dnevnik.hr)  
Broj info linije je: 01 23 56 3 56

**500 kn + 14 000 kn BONUS**  
PRONAĐITE PRVO SLOVO I ODGONETNITE RJEČ  
**ZOVITE SAD!**

**060 66 22 66**  
ZA KORISNIKE MOBILNIH UREDAJA  
djena poziva 3,41 / 30 sec  
(6,82 kn / min, ukj. PDV)

**060 88 11 88**  
ZA FIKSNE LINIJE  
djena poziva 3,66 kn  
(ukj. PDV)

Stop Mute FullScreen  
HRT1 HRT2 RTL NOV@

Done

10:38  
16.11.2006.



# Multikast paketi – Ethereal aplikacija

The screenshot displays the Ethereal (Wireshark) interface. The main pane shows a list of 21 captured packets, all of which are UDP multicast packets. The source IP is 161.53.12.254 and the destination IP is 239.192.10.13. The source port is 32820 and the destination port is 1234. The interface shows the packet list, packet details, and packet bytes panes.

No.	Time	Source	Destination	Protocol	Info
4	0.003958	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
5	0.004047	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
6	0.008076	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
7	0.008156	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
8	0.011974	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
9	0.012049	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
10	0.015770	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
11	0.015818	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
12	0.019759	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
13	0.019814	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
14	0.023782	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
15	0.023835	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
16	0.027332	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
17	0.027410	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
18	0.031346	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
19	0.031420	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
20	0.035310	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234
21	0.035368	161.53.12.254	239.192.10.13	UDP	Source port: 32820 Destination port: 1234

Packet details for Frame 4 (1358 bytes on wire, 1358 bytes captured):

- Ethernet II, Src: Intel\_2b:16:ac (00:02:b3:2b:16:ac), Dst: 01:00:5e:40:0a:0d (01:00:5e:40:0a:0d)
- Internet Protocol, Src: 161.53.12.254 (161.53.12.254), Dst: 239.192.10.13 (239.192.10.13)
- User Datagram Protocol, Src Port: 32820 (32820), Dst Port: 1234 (1234)
- Data (1316 bytes)

Packet bytes (hex and ASCII):

```

0000 01 00 5e 40 0a 0d 00 02 b3 2b 16 ac 08 00 45 00  ..AQ....+....E.
0010 05 40 06 79 40 00 01 11 c6 33 a1 35 0c fe ef c0  .@.y@...3.5...
0020 0a 0d 80 34 04 d2 05 2c af 5a 47 00 46 1f bb 24  ...4....ZG.F.($
0030 51 f7 5f 15 19 55 dc 5d 5c 37 81 c8 11 91 28 d9  Q...U.] \7....(
0040 32 05 dd 11 b7 32 7a da 36 af 2a 45 d4 13 3b bb  2....2Z. 6.WE...;
0050 d2 55 bd 31 84 f5 01 da b2 34 f0 67 c2 34 c5 5d  ?

```

File: "C:\DOCUME~1\DAKOP~1\LOCALS~1\Temp\etherXXX\Y8VIT1" 2553 KB 00:00:03 | IP: 192.1 D: 192.1 M: 0 Drops: 0

## Nadzor multikast-a

**Nadzor CARNet multikast mreže vrši se na sljedeće načine:**

- ▶ aktivna mjerenja – uspostava “*multicast beacons*”
- ▶ SNMP nadzor mrežnih uređaja
- ▶ mogućnost korisničke provjere prijema multikast prometa – “*multicast detektiv*” - <http://bwm.carnet.hr/>

## “Multikast beacon” aplikacija

### Koncepcija rada “multicast beacon” nadzorne aplikacije:

- središnji poslužitelj - služi za sakupljanje, praćenje i izradu pregleda statistike multikast mreže
- jedan ili više klijenata - međusobno generiraju multikast promet (UDP), na unaprijed definiranoj multikast grupi (IP adresi), te putem TCP protokola središnji poslužitelj izvještavaju o stanju multikast mreže

#	Hostname	IP Address	RRs	S0	S1	S2
R0	rodenbach.rdlab.carnet.hr	161.53.178.49	72	0	0	0
R1	beacon-st.fesb.hr	161.53.169.213	72	0	0	0
R2	noc-test-zg.srce.hr	193.198.229.134	66	0	0	0

## SNMP protokol za nadzor mreže

- > Za potrebe mrežnog nadzora multicast usluge te vođenje evidencije izvorišta multicast grupa (*group source(s)*) sa RP-jeva se vrše zabilježbe trenutnih aktivnih grupa te arhiva izvorišta multicast grupa za potrebe praćenja nastanka grupa i mogućih poredba multicast pravilnika.

Multicast | Pregled RPs-a | **Multicast grupe** | Multicast grupe (history) | Status MSDP susjeda | Multicast topologija

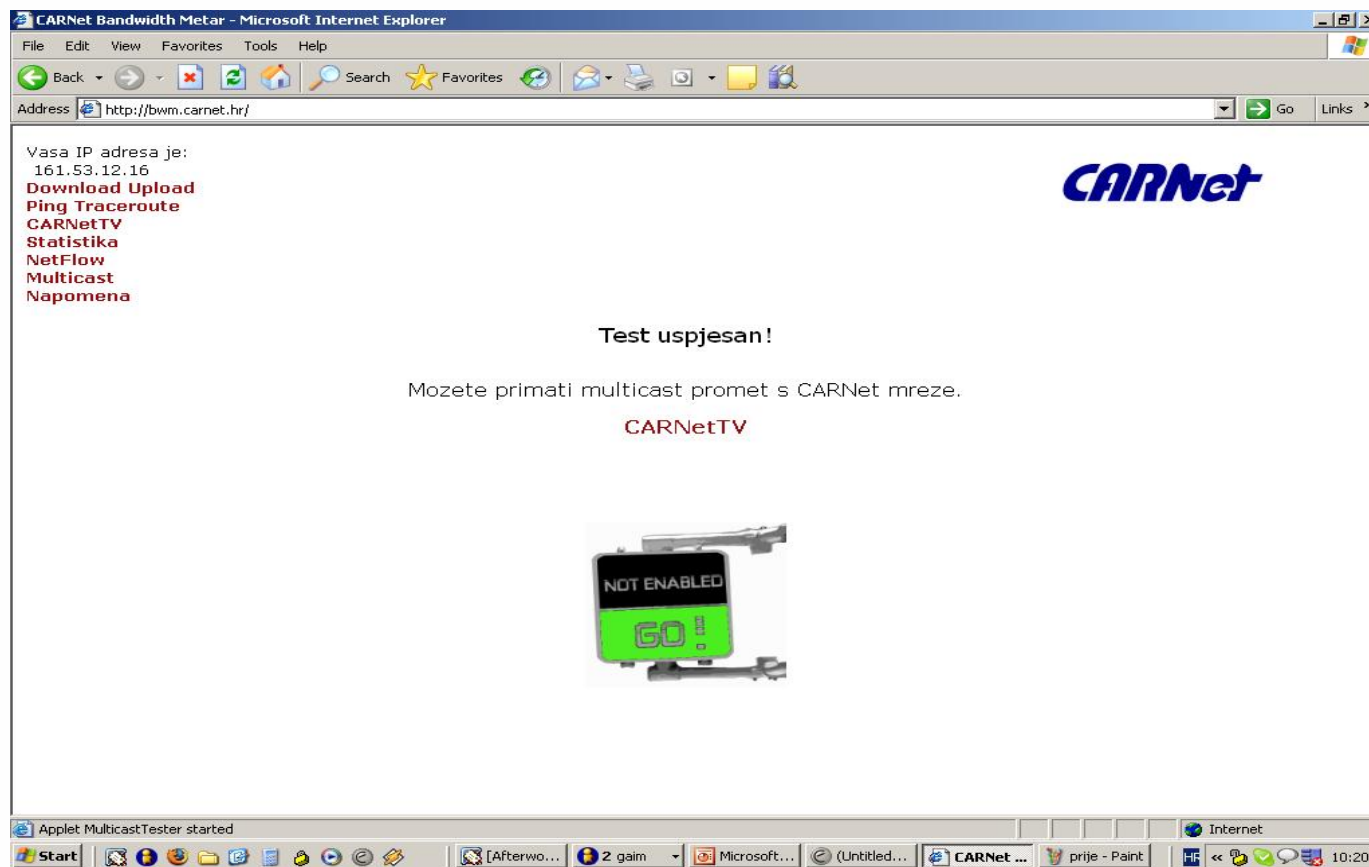
RP	Group	Source	State	UpTime	Expiry Time	Closest Member Hops	Protocol	Pkts	
CN-SRCE-RO	233.8.60.250	161.53.169.213	Forwarding(2)	1 dana, 02:42:42	00:03:29	1	pimSparseMode	1	+/-
CN-SRCE-RO	239.255.255.250	0.0.0.0	Forwarding(2)	49 dana, 17:02:47	00:02:43	1	pimSparseMode	0	+/-
CN-SRCE-RO	233.8.60.250	193.198.229.134	Forwarding(2)	1 dana, 02:40:56	00:03:27	1	pimSparseMode	1	+/-
CN-SRCE-RO	233.8.60.250	161.53.178.49	Forwarding(2)	1 dana, 02:40:56	00:03:27	1	pimSparseMode	1	+/-
CN-FESB-RO	233.8.60.250	0.0.0.0	Forwarding(2)	1 dana, 02:40:56	00:03:27	1	pimSparseMode	0	+/-

## Multikast detektiv

- Kako bi korisnici mogli provjeriti da li im je omogućen prijem multikast prometa, izrađena je vlastita aplikacija “**CARNet multikast detektiv**”. Aplikacija se veže na grupu koja je stalno aktivna – *multicast beacon grupa*.



# Multikast detektiv



CARNet Bandwidth Meter - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://bwm.carnet.hr/> Go Links >>

Vasa IP adresa je:  
161.53.12.16

**Download Upload**  
**Ping Traceroute**  
**CARNetTV**  
**Statistika**  
**NetFlow**  
**Multicast**  
**Napomena**

**CARNet**

**Test uspjesan!**

Mozete primati multicast promet s CARNet mreze.

**CARNetTV**

NOT ENABLED  
GO!

Applet MulticastTester started

Start [Afterwo... Z gain Microsoft... (Untitled... CARNet ... prije - Paint HR << >> 10:20

## Dobro došli u multikast CARNet...

- ▶ Pitanja i kontakti:

*[multicast@carnet.hr](mailto:multicast@carnet.hr)*