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|  |
| Telekomunikacijska omrežja |
| Poročilo o laboratorijskih vajah |
|  |
| **[Vnesite ime avtorja]** |
| **2010/2011** |

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Pri vseh laboratorijskih vajah smo za simulacijo omrežja uporabljali računalniško orodje Comnet III.

1. **Laboratorijska vaja: Analiza prometa uporabe internetnih storitev omrežja računalnikov**

Specifikacije:

* Skupina 13 računalnikov PC vaje
* Ethernet (CSMA/CD) povezava LKN 1 Gb/s med računalniki in usmerjevalnikom
* Usmerjevalnik
* Point-To-Point povezava E1 2 Mb/s med usmerjevalnikom in strežnikom
* Strežnik

Obravnavane internetne storitve, katerih parametre smo definirali za običajnega uporabnika interneta:

* Pošiljanje e-sporočil
* Branje HTML strani
* Ogled videa

Shema povezave v programu Comnet III:



Poročilo programa Comnet III:

Compuware COMNET III Release 2.5.2.814 Tue Nov 02 14:32:45 2010 PAGE 1

 Vaja1

 LINKS: CHANNEL UTILIZATION

 REPLICATION 1 FROM 0.0 TO 23123.3 SECONDS

 FRAMES TRANSMISSION DELAY (MS) %

LINK DELIVERED RST/ERR AVERAGE STD DEV MAXIMUM UTIL

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_

LKN 1Gb/s 697427 0 0.760 8.203 2429.294 1.7717

E1 2Mb/s

 FROM Usmerjevalnik 32744 0 0.156 0.003 0.156 0.0221

 FROM Streznik 208797 0 4.553 0.889 5.859 4.1108

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 Vaja1

 MESSAGE + RESPONSE SOURCES: MESSAGE DELIVERED

 REPLICATION 1 FROM 0.0 TO 23123.3 SECONDS

ORIGIN / MSG SRC NAME: MESSAGES MESSAGE DELAY

 DESTINATION LIST ASSEMBLED AVERAGE STD DEV MAXIMUM

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

PC vaje / src E-sporocilo:

 PC vaje 88 2724.201 MS 1460.376 MS 5065.093 MS

Streznik / src HTML:

 PC vaje 193 2273.545 MS 709.820 MS 6897.850 MS

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 Vaja1

 SESSION SOURCES: MESSAGE DELIVERED

 REPLICATION 1 FROM 0.0 TO 23123.3 SECONDS

ORIGIN / SESSION SRC: MESSAGES MESSAGE DELAY

 DESTINATION LIST ASSEMBLED AVERAGE STD DEV MAXIMUM

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

Streznik / src Video:

 PC vaje 143995 9.842 MS 65.884 MS 2433.420 MS

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 Vaja1

 SESSION SOURCES: SETUP COUNTS

 REPLICATION 1 FROM 0.0 TO 23123.3 SECONDS

ORIGIN / SESSION SRC NAME: NUMBER OF SESSIONS

 DESTINATION LIST TRIED SETUP RETRY BLOCK DISCON RERTD

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

Streznik / src Video:

 PC vaje 18 18 0 0 0 0

1. **Laboratorijska vaja: Analiza protokolov Aloha in Slotted Aloha**

Specifikacije:

* Skupina 500 delovnih postaj z izvorom sporočil
* Izvor sporočil
* Delovne postaje povezane med seboj z Aloha in Slotted Aloha
* Aloha 100 kbit/s
* Slotted Aloha 100 kbit/s s časovnimi rezinami po 10 ms

Shema povezave v programu Comnet III:



Poročilo in diagram za Aloha:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 500 |  Delovnih postaj |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 100000 |  bit/s hitrost prenosnega medija |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 1000 |  bitov na okvir |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 100000 |  število paketov za simulacijo |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Obr. | **bit/s** | **IAT [s]** | **Preneseni** | **Trčeni** | **Čas Sim [s]** | **Kapaciteta** | **S** | **G** |  |  |  |  |  |  |  |  |
| 1,0% | 1000 | 500,0000 | 99869 | 2066 | 100000 | 10000000000 | 0,0100 | 0,0102 |  |  |  |  |  |  |  |  |
| 5,0% | 5000 | 100,0000 | 99867 | 11819 | 20000 | 2000000000 | 0,0499 | 0,0558 |

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 |  |  |  |  |  |  |  |
| 10,0% | 10000 | 50,0000 | 99867 | 30155 | 10000 | 1000000000 | 0,0999 | 0,1300 |  |  |  |  |  |  |  |  |
| 10,5% | 10500 | 47,6190 | 99868 | 33019 | 9524 | 952380952 | 0,1049 | 0,1395 |  |  |  |  |  |  |  |  |
| 11,0% | 11000 | 45,4545 | 99869 | 34768 | 9091 | 909090909 | 0,1099 | 0,1481 |  |  |  |  |  |  |  |  |
| 11,5% | 11500 | 43,4783 | 99870 | 38147 | 8696 | 869565217 | 0,1149 | 0,1587 |  |  |  |  |  |  |  |  |
| 12,0% | 12000 | 41,6667 | 99862 | 40019 | 8333 | 833333333 | 0,1198 | 0,1679 |  |  |  |  |  |  |  |  |
| 12,5% | 12500 | 40,0000 | 456 | 3941162 | 8000 | 800000000 | 0,0006 | 4,9270 |  |  |  |  |  |  |  |  |
| 13,0% | 13000 | 38,4615 | 446 | 3788064 | 7692 | 769230769 | 0,0006 | 4,9251 |  |  |  |  |  |  |  |  |
| 13,5% | 13500 | 37,0370 | 427 | 3649073 | 7407 | 740740741 | 0,0006 | 4,9268 |  |  |  |  |  |  |  |  |
| 14,0% | 14000 | 35,7143 | 370 | 3520690 | 7143 | 714285714 | 0,0005 | 4,9295 |  |  |  |  |  |  |  |  |
| 14,5% | 14500 | 34,4828 | 345 | 3400179 | 6897 | 689655172 | 0,0005 | 4,9308 |  |  |  |  |  |  |  |  |
| 15,0% | 15000 | 33,3333 | 304 | 3288646 | 6667 | 666666667 | 0,0005 | 4,9334 |  |  |  |  |  |  |  |  |
| 20,0% | 20000 | 25,0000 | 154 | 2467381 | 5000 | 500000000 | 0,0003 | 4,9351 |  |  |  |  |  |  |  |  |
| 25,0% | 25000 | 20,0000 | 132 | 1974294 | 4000 | 400000000 | 0,0003 | 4,9361 |  |  |  |  |  |  |  |  |
| 30,0% | 30000 | 16,6667 | 124 | 1645234 | 3333 | 333333333 | 0,0004 | 4,9361 |  |  |  |  |  |  |  |  |
| 35,0% | 35000 | 14,2857 | 93 | 1410866 | 2857 | 285714286 | 0,0003 | 4,9384 |  |  |  |  |  |  |  |  |
| 40,0% | 40000 | 12,5000 | 68 | 1234079 | 2500 | 250000000 | 0,0003 | 4,9366 |  |  |  |  |  |  |  |  |
| 45,0% | 45000 | 11,1111 | 66 | 1097584 | 2222 | 222222222 | 0,0003 | 4,9394 |  |  |  |  |  |  |  |  |
| 50,0% | 50000 | 10,0000 | 63 | 987493 | 2000 | 200000000 | 0,0003 | 4,9378 |  |  |  |  |  |  |  |  |
| 55,0% | 55000 | 9,0909 | 59 | 897561 | 1818 | 181818182 | 0,0003 | 4,9369 |  |  |  |  |  |  |  |  |
| 60,0% | 60000 | 8,3333 | 53 | 823343 | 1667 | 166666667 | 0,0003 | 4,9404 |  |  |  |  |  |  |  |  |
| 65,0% | 65000 | 7,6923 | 41 | 759869 | 1538 | 153846154 | 0,0003 | 4,9394 |  |  |  |  |  |  |  |  |
| 70,0% | 70000 | 7,1429 | 45 | 706123 | 1429 | 142857143 | 0,0003 | 4,9432 |  |  |  |  |  |  |  |  |
| 75,0% | 75000 | 6,6667 |  |  | 1333 | 133333333 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 80,0% | 80000 | 6,2500 |  |  | 1250 | 125000000 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 85,0% | 85000 | 5,8824 |  |  | 1176 | 117647059 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 90,0% | 90000 | 5,5556 |  |  | 1111 | 111111111 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 95,0% | 95000 | 5,2632 |  |  | 1053 | 105263158 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 100,0% | 100000 | 5,0000 |  |  | 1000 | 100000000 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Poročilo za Slotted Aloha:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 500 | Delovnih postaj |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 100000 | bit/s hitrost prenosnega medija |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 1000 | bitov na okvir |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | 100000 | število paketov za simulacijo |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Obr. | **bit/s** | **IAT [s]** | **Preneseni** | **Trčeni** | **Čas Sim [s]** | **Kapaciteta** | **S** | **G** |  |  |  |  |  |  |  |  |
| 1,00% | 1000 | 500,0000 | 99868 | 1410 | 100000 | 10000000000 | 0,0100 | 0,0101 |  |  |  |  |  |  |  |  |
| 5,00% | 5000 | 100,0000 | 99869 | 8569 | 20000 | 2000000000 | 0,0499 | 0,0542 |  |  |  |  |  |  |  |  |
| 10,00% | 10000 | 50,0000 | 99868 | 21408 | 10000 | 1000000000 | 0,0999 | 0,1213 |  |  |  |  |  |  |  |  |
| 15,00% | 15000 | 33,3333 | 99867 | 43955 | 6667 | 666666667 | 0,1498 | 0,2157 |  |  |  |  |  |  |  |  |
| 15,50% | 15500 | 32,2581 | 99868 | 46006 | 6452 | 645161290 | 0,1548 | 0,2261 |  |  |  |  |  |  |  |  |
| 16,00% | 16000 | 31,2500 | 99864 | 50063 | 6250 | 625000000 | 0,1598 | 0,2399 |  |  |  |  |  |  |  |  |
| 16,50% | 16500 | 30,3030 | 99871 | 54806 | 6061 | 606060606 | 0,1648 | 0,2552 |  |  |  |  |  |  |  |  |
| 17,00% | 17000 | 29,4118 | 99858 | 59663 | 5882 | 588235294 | 0,1698 | 0,2712 |  |

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| 17,05% | 17050 | 29,3255 | 99863 | 58915 | 5865 | 586510264 | 0,1703 | 0,2707 |  |  |  |  |  |  |  |  |
| 17,10% | 17100 | 29,2398 | 53120 | 1386551 | 5848 | 584795322 | 0,0908 | 2,4618 |  |  |  |  |  |  |  |  |
| 17,15% | 17150 | 29,1545 | 99865 | 62404 | 5831 | 583090379 | 0,1713 | 0,2783 |  |  |  |  |  |  |  |  |
| 17,20% | 17200 | 29,0698 | 99863 | 61347 | 5814 | 581395349 | 0,1718 | 0,2773 |  |  |  |  |  |  |  |  |
| 17,25% | 17250 | 28,9855 | 99865 | 64118 | 5797 | 579710145 | 0,1723 | 0,2829 |  |  |  |  |  |  |  |  |
| 17,30% | 17300 | 28,9017 | 99853 | 65142 | 5780 | 578034682 | 0,1727 | 0,2854 |  |  |  |  |  |  |  |  |
| 17,35% | 17350 | 28,8184 | 61000 | 1153751 | 5764 | 576368876 | 0,1058 | 2,1076 |  |  |  |  |  |  |  |  |
| 17,40% | 17400 | 28,7356 | 99859 | 66431 | 5747 | 574712644 | 0,1738 | 0,2893 |  |  |  |  |  |  |  |  |
| 17,45% | 17450 | 28,6533 | 42677 | 1643396 | 5731 | 573065903 | 0,0745 | 2,9422 |  |  |  |  |  |  |  |  |
| 17,50% | 17500 | 28,5714 | 60399 | 1161102 | 5714 | 571428571 | 0,1057 | 2,1376 |  |  |  |  |  |  |  |  |
| 18,00% | 18000 | 27,7778 | 42697 | 1591844 | 5556 | 555555556 | 0,0769 | 2,9422 |  |  |  |  |  |  |  |  |
| 18,50% | 18500 | 27,0270 | 39622 | 1625721 | 5405 | 540540541 | 0,0733 | 3,0809 |  |  |  |  |  |  |  |  |
| 19,00% | 19000 | 26,3158 | 41505 | 1536489 | 5263 | 526315789 | 0,0789 | 2,9982 |  |  |  |  |  |  |  |  |
| 19,50% | 19500 | 25,6410 | 41551 | 1495505 | 5128 | 512820513 | 0,0810 | 2,9973 |  |  |  |  |  |  |  |  |
| 20,00% | 20000 | 25,0000 | 41623 | 1455668 | 5000 | 500000000 | 0,0832 | 2,9946 |  |  |  |  |  |  |  |  |
| 25,00% | 25000 | 20,0000 | 3433 | 1953528 | 4000 | 400000000 | 0,0086 | 4,8924 |  |  |  |  |  |  |  |  |
| 30,00% | 30000 | 16,6667 | 3002 | 1633050 | 3333 | 333333333 | 0,0090 | 4,9082 |  |  |  |  |  |  |  |  |
| 35,00% | 35000 | 14,2857 | 2943 | 1400754 | 2857 | 285714286 | 0,0103 | 4,9129 |  |  |  |  |  |  |  |  |
| 40,00% | 40000 | 12,5000 | 2923 | 1225778 | 2500 | 250000000 | 0,0117 | 4,9148 |  |  |  |  |  |  |  |  |
| 45,00% | 45000 | 11,1111 | 2865 | 1091055 | 2222 | 222222222 | 0,0129 | 4,9226 |  |  |  |  |  |  |  |  |
| 50,00% | 50000 | 10,0000 | 2744 | 981776 | 2000 | 200000000 | 0,0137 | 4,9226 |  |  |  |  |  |  |  |  |
| 55,00% | 55000 | 9,0909 | 2632 | 892321 | 1818 | 181818182 | 0,0145 | 4,9222 |  |  |  |  |  |  |  |  |
| 60,00% | 60000 | 8,3333 | 2526 | 818426 | 1667 | 166666667 | 0,0152 | 4,9257 |  |  |  |  |  |  |  |  |
| 65,00% | 65000 | 7,6923 | 2406 | 755541 | 1538 | 153846154 | 0,0156 | 4,9267 |  |  |  |  |  |  |  |  |
| 70,00% | 70000 | 7,1429 | 2282 | 702071 | 1429 | 142857143 | 0,0160 | 4,9305 |  |  |  |  |  |  |  |  |
| 75,00% | 75000 | 6,6667 |  |  | 1333 | 133333333 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 80,00% | 80000 | 6,2500 |  |  | 1250 | 125000000 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 85,00% | 85000 | 5,8824 |  |  | 1176 | 117647059 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 90,00% | 90000 | 5,5556 |  |  | 1111 | 111111111 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 95,00% | 95000 | 5,2632 |  |  | 1053 | 105263158 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
| 100,00% | 100000 | 5,0000 |  |  | 1000 | 100000000 | 0,0000 | 0,0000 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Diagram za Slotted Aloha:

1. **Laboratorijska vaja: Analiza VoIP storitve preko omrežja dveh skupin računalnikov**

Specifikacije:

* Dve skupini po 15 računalnikov, S1 in S2
* 10BaseT ethernet (CSMA/CD) povezava

Obravnavana storitev:

* Pogovor

Shema povezave v programu Comnet III:

Poročila in diagrami:

Obremenitev/Št. pogovorov in Zakasnitev/št. pogovorov:

* 10% predobremenitev omrežja :

|  |  |  |
| --- | --- | --- |
|   | Obremenitev [%] | Zakasnitev VOIP [ms] |
| Pogovorov | Skupaj | Backgrnd | VOIP | AVG | STD | MAX |
|  5 | 16,29 | 11,60 | 4,69 | 0,120 | 0,216 | 6,293 |
| 10 | 22,69 | 12,54 | 10,15 | 0,133 | 0,280 | 13,274 |
| 15 | 29,09 | 13,14 | 15,950 | 0,141 | 0,339 | 20,988 |
| 20 | 35,49 | 13,56 | 21,93 | 0,172 | 0,477 | 36,987 |
| 25 | 41,88 | 13,86 | 28,02 | 0,228 | 1,037 | 135,960 |
| 30 | 48,83 | 14,70 | 34,13 | 0,415 | 2,210 | 151,826 |
| 35 | 54,59 | 14,25 | 40,34 | 0,641 | 4,259 | 220,360 |
| 40 | 60,88 | 14,38 | 46,50 | 2,262 | 22,178 | 1239,302 |
| 45 | 66,73 | 14,45 | 52,28 | 135,500 | 337,500 | 3341,500 |
| 50 | 69,24 | 13,76 | 55,48 | 1106,776 | 1456,308 | 10824,308 |
| 55 | 69,17 | 12,62 | 56,55 | 1820,000 | 1925,000 | 12339,000 |
| 60 | 69,28 | 11,75 | 57,53 | 1909,730 | 1890,450 | 10571,820 |
| 65 | 69,35 | 11,13 | 58,22 | 2384,000 | 2073,000 | 10590,000 |
| 70 | 69,32 | 10,36 | 58,96 | 2788,500 | 2311,500 | 11239,500 |
| 75 |  |  |  |  |  |  |
| 80 |  |  |  |  |  |  |
| 90 |  |  |  |  |  |  |
| 95 |  |  |  |  |  |  |
| 100 |  |  |  |  |  |  |

* 20% predobremenitev:
* 30% predobremenitev:
* 40% predobremenitev:
* 50% predobremenitev:

Obremenitev/Promet v ozadju in Zakasnitev/Promet v ozadju:

* 5 pogovorov:

|  |  |  |
| --- | --- | --- |
|  | Obremenitev [%] | Zakasnitev VOIP [ms] |
| Backgrnd | Skupaj | Backgrnd | VOIP | AVG | STD | MAX |
| 10 | 16,29 | 11,6 | 4,69 | 0,12 | 0,216 | 6,293 |
| 20 | 26,15 | 21,75 | 4,4 | 0,194 | 0,412 | 25,985 |
| 30 | 36,21 | 31,93 | 4,28 | 0,328 | 0,895 | 57,274 |
| 40 | 46,19 | 41,97 | 4,22 | 0,675 | 2,205 | 175,328 |
| 50 | 56,04 | 51,86 | 4,18 | 1,903 | 8,215 | 205,465 |

* 10 pogovorov:
* 20 pogovorov:
* 30 pogovorov:
* 50 pogovorov:

STD zakasnitve/Število sočasnih pogovorov:

|  |  |
| --- | --- |
|  | STD |
| Pogo-vorov | 10% | 20% | 30% | 40% | 50% |
| 5 | 0,22 | 0,41 | 0,90 | 2,21 | 8,22 |
| 10 | 0,28 | 0,59 | 1,77 | 16,40 | 110,32 |
| 15 | 0,34 | 1,19 | 4,29 | 47,84 | 1455,81 |
| 20 | 0,48 | 1,95 | 16,94 | 232,50 | 1103,30 |
| 25 | 1,04 | 3,97 | 55,89 | 817,72 | 1830,82 |
| 30 | 2,21 | 21,50 | 330,00 | 1128,00 | 3500,00 |
| 35 | 4,26 | 89,22 | 898,49 | 3467,85 | 5880,00 |
| 40 | 22,18 | 365,34 | 3852,32 | 4815,00 | 3340,00 |
| 45 | 337,50 | 1849,46 | 2836,92 | 3462,58 | 3897,19 |
| 50 | 1456,31 | 2621,23 | 3077,94 | 3126,22 | 3411,98 |
| 55 | 1925,00 | 2671,00 | 2907,00 | 3070,00 | 3530,00 |
| 60 | 1890,45 | 2101,43 | 2473,87 | 2720,97 | 2890,60 |
| 65 | 2073,00 | 2874,00 | 3112,00 | 3332,00 | 3329,00 |
| 70 | 2311,50 | 2409,00 | 2717,00 | 2942,00 | 3250,00 |
| 75 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 80 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 90 |  |  |  |  |  |
| 95 |  |  |  |  |  |
| 100 |  |  |  |  |  |

STD/Skupna obremenitev omrežja:

|  |  |
| --- | --- |
|  | STD (Standard deviation) |
| Pogovorov | 10% | 20% | 30% | 40% | 50% |
| 5 | 0,22 | 0,41 | 0,90 | 2,21 | 8,22 |
| 10 | 0,28 | 0,59 | 1,77 | 16,40 | 110,32 |
| 15 | 0,34 | 1,19 | 4,29 | 47,84 | 1455,81 |
| 20 | 0,48 | 1,95 | 16,94 | 232,50 | 1103,30 |
| 25 | 1,04 | 3,97 | 55,89 | 817,72 | 1830,82 |
| 30 | 2,21 | 21,50 | 330,00 | 1128,00 | 3500,00 |
| 35 | 4,26 | 89,22 | 898,49 | 3467,85 | 5880,00 |
| 40 | 22,18 | 365,34 | 3852,32 | 4815,00 | 3340,00 |
| 45 | 337,50 | 1849,46 | 2836,92 | 3462,58 | 3897,19 |
| 50 | 1456,31 | 2621,23 | 3077,94 | 3126,22 | 3411,98 |
| 55 | 1925,00 | 2671,00 | 2907,00 | 3070,00 | 3530,00 |
| 60 | 1890,45 | 2101,43 | 2473,87 | 2720,97 | 2890,60 |
| 65 | 2073,00 | 2874,00 | 3112,00 | 3332,00 | 3329,00 |
| 70 | 2311,50 | 2409,00 | 2717,00 | 2942,00 | 3250,00 |
| 75 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 80 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 90 |  |  |  |  |  |
| 95 |  |  |  |  |  |
| 100 |  |  |  |  |  |

|  |  |
| --- | --- |
|  | Skupna obremenitev |
| Pogovorov | 10% | 20% | 30% | 40% | 50% |
| 5 | 16,29 | 26,15 | 36,21 | 46,19 | 56,04 |
| 10 | 22,69 | 32,55 | 42,59 | 52,56 | 62,36 |
| 15 | 29,09 | 38,93 | 48,95 | 58,89 | 68,01 |
| 20 | 35,49 | 45,30 | 55,26 | 65,15 | 74,27 |
| 25 | 41,88 | 51,66 | 61,56 | 71,35 | 80,17 |
| 30 | 48,83 | 57,98 | 67,72 | 77,15 | 82,57 |
| 35 | 54,59 | 64,23 | 73,71 | 79,00 | 81,59 |
| 40 | 60,88 | 70,36 | 74,92 | 77,38 | 78,87 |
| 45 | 66,73 | 71,48 | 73,74 | 75,69 | 77,63 |
| 50 | 69,24 | 71,33 | 73,05 | 74,53 | 76,36 |
| 55 | 69,17 | 70,97 | 72,56 | 73,98 | 75,32 |
| 60 | 69,28 | 70,87 | 72,27 | 73,50 | 74,87 |
| 65 | 69,35 | 70,71 | 72,08 | 73,17 | 74,36 |
| 70 | 69,32 | 70,65 | 71,93 | 73,00 | 74,20 |
| 75 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 80 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 90 |  |  |  |  |  |
| 95 |  |  |  |  |  |
| 100 |  |  |  |  |  |

1. **Laboratorijska vaja: Analiza Best Effort in Differentiated Services, obremenjenost povezave ter koliko prometa poteka v realnem času**

Specifikacije:

* Usmerjevalnika Vozel 1 in 2 tipa Cisco 2500
* Usmerjevalnika med sabo povezana s Point-To-Point povezavo 2048
* Point-To-Point povezava s hitrostjo 2048 kbps

Obravnavane storitve:

* FTP (Ni v realnem času N-RT)
* WWW (Ni v realnem času N-RT)
* Video (V realnem času RT)
* Govor (V realnem času RT)

Shema povezave v programu Comnet III:



Rezultati: