

The image displays three terminal windows, each showing a different stage of a distributed system's operation. The windows are titled 'xterm' and have a standard Linux terminal interface with a title bar and window controls.

Terminal 1 (Top Left): Shows the server preparing a response and the client sending a message. The output includes:

```
*SERVIDOR: Preparando resposta...
> Update recebido...
*CLIENTE: Socket inicializado.
*CLIENTE: 0 endereço ip 10.0.0.2 endereço válido.
*CLIENTE: Preparando conexão com o servidor 10.0.0.2 para envio de pacote.
*CLIENTE: Mensagem 4300000D02 enviada ao servidor 10.0.0.2
info
>>> ID NODO.....: 3330
>>> IP NODO.....: 10.0.0.1
>>> ID ANTECESSOR...: 2028
>>> IP ANTECESSOR...: 10.0.0.2
>>> ID SUCESSOR.....: 2028
>>> IP SUCESSOR.....: 10.0.0.2
>>> Comando "info" foi executado com sucesso.
```

Terminal 2 (Top Right): Shows the server receiving the message and the client sending a message. The output includes:

```
*SERVIDOR: Preparando resposta...
info
>>> ID NODO.....: 2028
>>> IP NODO.....: 10.0.0.2
>>> ID ANTECESSOR...: 3330
>>> IP ANTECESSOR...: 10.0.0.1
>>> ID SUCESSOR.....: 3330
>>> IP SUCESSOR.....: 10.0.0.1
>>> Comando "info" foi executado com sucesso.
```

Terminal 3 (Bottom): Shows the server receiving the message and the client sending a message. The output includes:

```
*SERVIDOR: Preparando resposta...
info
>>> ID NODO.....: 5464
>>> IP NODO.....: 10.0.0.3
>>> ID ANTECESSOR...: 5464
>>> IP ANTECESSOR...: 10.0.0.3
>>> ID SUCESSOR.....: 5464
>>> IP SUCESSOR.....: 10.0.0.3
>>> Comando "info" foi executado com sucesso.
```

c) Lookup entre hosts (.3 para .2)

[illegible]

d) Lookup entre hosts (.4 para .3)

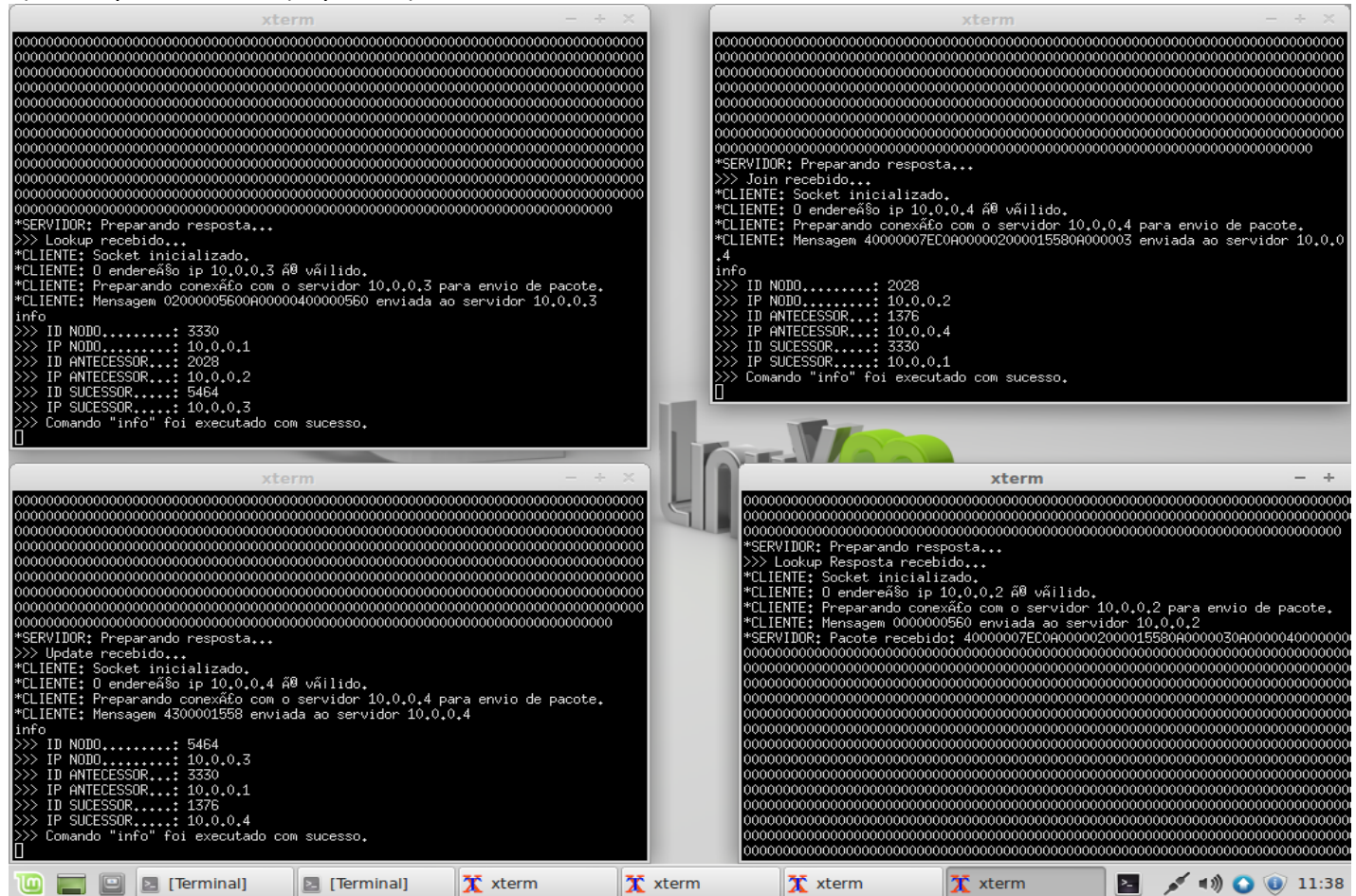
The image displays four terminal windows arranged in a 2x2 grid, each showing the output of a network-related program. The top-left window shows the server's perspective, with messages like '*SERVIDOR: Preparando resposta...' and '*** Update recebido...'. The top-right window shows the client's perspective, with messages like '*CLIENTE: Socket inicializado.' and '*CLIENTE: Preparando conexão com o servidor 10.0.0.4 para envio de pacote.'. The bottom-left window shows the server receiving a message from the client and responding. The bottom-right window shows the client receiving a message from the server and responding. All windows show the command 'info' being executed successfully, displaying details like IP addresses and node IDs.

Resultado: rede ordenada com 4 nós.

Cenário 2: Formação de rede em anel com 4 nós com lookup foward.

Este teste parte da letra c) do cenário anterior.

a) Lookup entre hosts (.4 para .2)



The image displays four terminal windows arranged in a 2x2 grid, showing the execution of a network lookup command in a ring topology. Each terminal has a title bar with 'xterm' and standard window controls. The background of the terminals shows a faint 3D rendering of a network switch and cables.

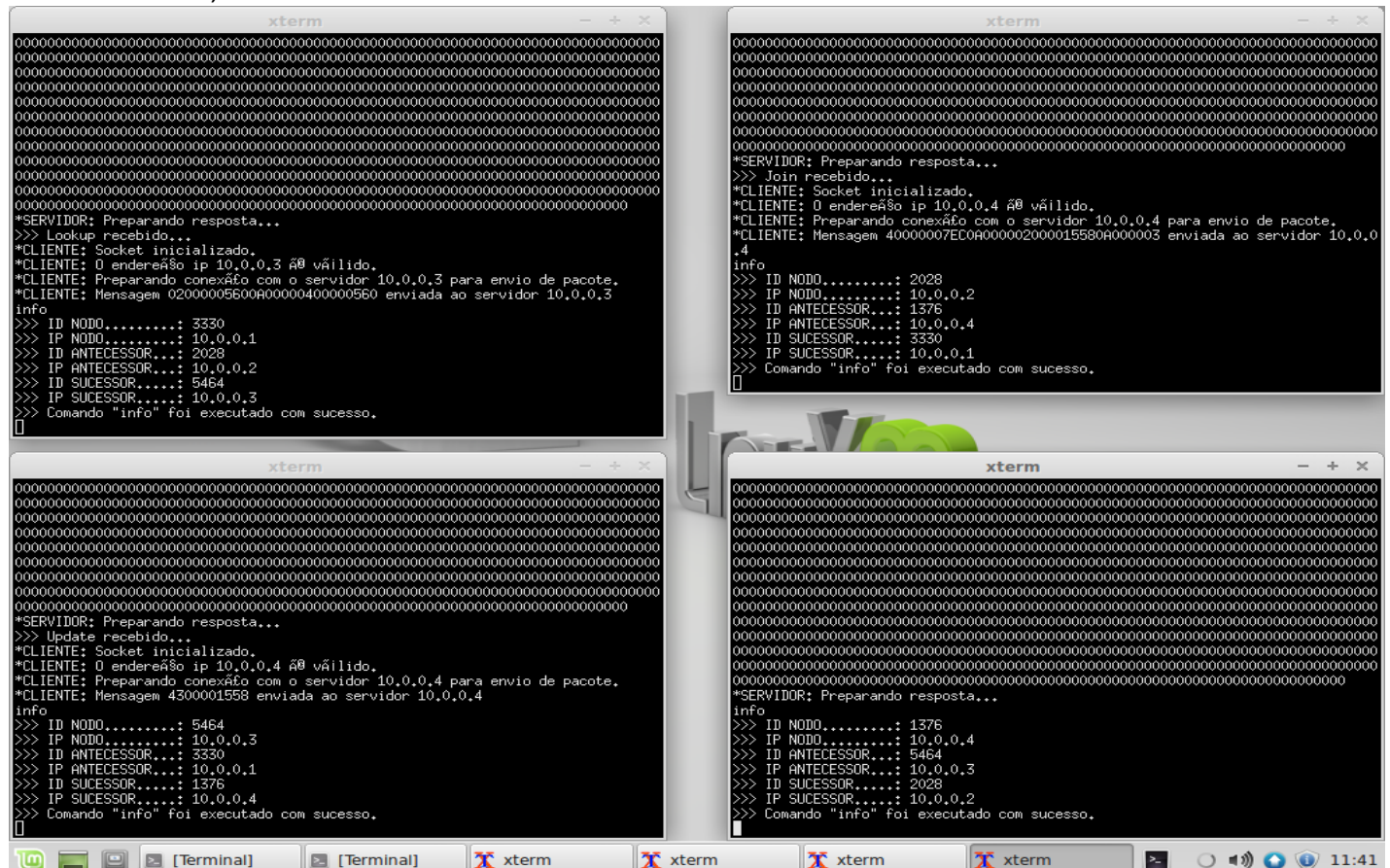
Top-Left Terminal: Shows the initial state where the server is preparing a response. The client (10.0.0.3) sends a packet to the server (10.0.0.3) with message 0200000560. The server responds with an 'info' command, listing the node ID (3330), IP (10.0.0.1), predecessor (2028), successor (5464), and the command was executed successfully.

Top-Right Terminal: Shows the server preparing a response. The client (10.0.0.4) sends a packet to the server (10.0.0.4) with message 40000007E0A00000200015580A000003. The server responds with an 'info' command, listing the node ID (2028), IP (10.0.0.2), predecessor (1376), successor (3330), and the command was executed successfully.

Bottom-Left Terminal: Shows the server preparing a response. The client (10.0.0.4) sends a packet to the server (10.0.0.4) with message 4300001558. The server responds with an 'info' command, listing the node ID (5464), IP (10.0.0.3), predecessor (3330), successor (1376), and the command was executed successfully.

Bottom-Right Terminal: Shows the server preparing a response. The client (10.0.0.2) sends a packet to the server (10.0.0.2) with message 0000000560. The server responds with an 'info' command, listing the node ID (2028), IP (10.0.0.2), predecessor (1376), successor (3330), and the command was executed successfully.

Como resultado, uma rede ordenada com 4 nós é formada:



The image displays four terminal windows arranged in a 2x2 grid, showing the execution of a network lookup command in a ring topology. Each terminal has a title bar with 'xterm' and standard window controls. The background of the terminals shows a faint 3D rendering of a network switch and cables.

Top-Left Terminal: Shows the initial state where the server is preparing a response. The client (10.0.0.3) sends a packet to the server (10.0.0.3) with message 0200000560. The server responds with an 'info' command, listing the node ID (3330), IP (10.0.0.1), predecessor (2028), successor (5464), and the command was executed successfully.

Top-Right Terminal: Shows the server preparing a response. The client (10.0.0.4) sends a packet to the server (10.0.0.4) with message 40000007E0A00000200015580A000003. The server responds with an 'info' command, listing the node ID (2028), IP (10.0.0.2), predecessor (1376), successor (3330), and the command was executed successfully.

Bottom-Left Terminal: Shows the server preparing a response. The client (10.0.0.4) sends a packet to the server (10.0.0.4) with message 4300001558. The server responds with an 'info' command, listing the node ID (5464), IP (10.0.0.3), predecessor (3330), successor (1376), and the command was executed successfully.

Bottom-Right Terminal: Shows the server preparing a response. The client (10.0.0.2) sends a packet to the server (10.0.0.2) with message 0000000560. The server responds with an 'info' command, listing the node ID (2028), IP (10.0.0.2), predecessor (1376), successor (3330), and the command was executed successfully.

a) leave de .3

b) leave de .4

The image displays a network simulation environment with four terminal windows. The top-left terminal (xterm) shows a server (SERVIDOR) and client (CLIENTE) interaction. The top-right terminal (vterm) shows a disconnected network interface (Rede Ethernet) with a message 'Não mostrar esta mensagem novamente'. The bottom-left terminal (xterm) shows a server (SERVIDOR) and client (CLIENTE) interaction. The bottom-right terminal (xterm) shows a server (SERVIDOR) and client (CLIENTE) interaction. The background shows a desk with a monitor, keyboard, and mouse.

c) leave de .2

[illegible]

2. Conformidade dos pacotes

Captura de pacote para demonstrar a conformidade das mensagens enviadas e recebidas com a especificação do trabalho:

Lookup

Envio:

197	96.79509600(90.0.0.105	90.0.0.102	UDP	55	Source port: 59567	Destination port: italk
201	96.89967300(90.0.0.102	90.0.0.105	UDP	55	Source port: italk	Destination port: 59567
202	96.90151300(90.0.0.105	90.0.0.102	UDP	47	Source port: 59568	Destination port: italk
203	96.90734900(90.0.0.102	90.0.0.105	UDP	59	Source port: italk	Destination port: 59568
204	96.91063300(90.0.0.105	90.0.0.102	UDP	55	Source port: 59569	Destination port: italk
205	96.91747000(90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569

+

Frame 197: 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface 0

+

Ethernet II, Src: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba), Dst: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1)

+

Internet Protocol Version 4, Src: 90.0.0.105 (90.0.0.105), Dst: 90.0.0.102 (90.0.0.102)

+

User Datagram Protocol, Src Port: 59567 (59567), Dst Port: italk (12345)

-

Data (13 bytes)

Data: 02343933315a00006930656666

[Length: 13]

0000	b4 b6 76 5e 41 a1 00 25	86 ec b9 ba 08 00 45 00	..v^A...%E.
0010	00 29 3f c2 00 00 80 11	4f bc 5a 00 00 69 5a 00	.)6@.... 0.Z..fZ.
0020	00 66 e8 af 30 39 00 15	90 b3 02 34 39 33 31 5a	.f..09.. ...4931z
0030	00 00 69 30 65 66 66		..ioeff

Resposta:

197	96.79509600(90.0.0.105	90.0.0.102	UDP	55	Source port: 59567	Destination port: italk
201	96.89967300(90.0.0.102	90.0.0.105	UDP	55	Source port: italk	Destination port: 59567
202	96.90151300(90.0.0.105	90.0.0.102	UDP	47	Source port: 59568	Destination port: italk
203	96.90734900(90.0.0.102	90.0.0.105	UDP	59	Source port: italk	Destination port: 59568
204	96.91063300(90.0.0.105	90.0.0.102	UDP	55	Source port: 59569	Destination port: italk
205	96.91747000(90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569

+

Frame 201: 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface 0

+

Ethernet II, Src: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1), Dst: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba)

+

Internet Protocol Version 4, Src: 90.0.0.102 (90.0.0.102), Dst: 90.0.0.105 (90.0.0.105)

+

User Datagram Protocol, Src Port: italk (12345), Dst Port: 59567 (59567)

-

Data (13 bytes)

Data: 4230656666306566665a000066

[Length: 13]

0000	00 25 86 ec b9 ba b4 b6	76 5e 41 a1 08 00 45 00	..%..... v^A...E.
0010	00 29 3f c2 00 00 80 11	46 33 5a 00 00 66 5a 00	.)?... F3Z..fZ.
0020	00 69 30 39 e8 af 00 15	f2 83 42 30 65 66 66 30	.io9.... ..B0eff0
0030	65 66 66 5a 00 00 66		effz..f

Join

Envio:

197	96.79509600(90.0.0.105	90.0.0.102	UDP	55	Source port: 59567	Destination port: italk
201	96.89967300(90.0.0.102	90.0.0.105	UDP	55	Source port: italk	Destination port: 59567
202	96.90151300(90.0.0.105	90.0.0.102	UDP	47	Source port: 59568	Destination port: italk
203	96.90734900(90.0.0.102	90.0.0.105	UDP	59	Source port: italk	Destination port: 59568
204	96.91063300(90.0.0.105	90.0.0.102	UDP	55	Source port: 59569	Destination port: italk
205	96.91747000(90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569

+

Frame 202: 47 bytes on wire (376 bits), 47 bytes captured (376 bits) on interface 0

+

Ethernet II, Src: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba), Dst: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1)

+

Internet Protocol Version 4, Src: 90.0.0.105 (90.0.0.105), Dst: 90.0.0.102 (90.0.0.102)

+

User Datagram Protocol, Src Port: 59568 (59568), Dst Port: italk (12345)

-

Data (5 bytes)

Data: 0034393331

[Length: 5]

0000	b4 b6 76 5e 41 a1 00 25	86 ec b9 ba 08 00 45 00	..v^A...%E.
0010	00 21 36 41 00 00 80 11	4f bc 5a 00 00 69 5a 00	..!6A.... 0.Z..fZ.
0020	00 66 e8 b0 30 39 00 0d	c7 b3 00 34 39 33 31	.f..09.. ...4931

Resposta:

197	96.79509600	90.0.0.105	90.0.0.102	UDP	55	Source port: 59567	Destination port: italk
201	96.89967300	90.0.0.102	90.0.0.105	UDP	55	Source port: italk	Destination port: 59567
202	96.90151300	90.0.0.105	90.0.0.102	UDP	47	Source port: 59568	Destination port: italk
203	96.90734900	90.0.0.102	90.0.0.105	UDP	59	Source port: italk	Destination port: 59568
204	96.91063300	90.0.0.105	90.0.0.102	UDP	55	Source port: 59569	Destination port: italk
205	96.91747000	90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569

+	Frame 203: 59 bytes on wire (472 bits), 59 bytes captured (472 bits) on interface 0
+	Ethernet II, Src: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1), Dst: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba)
+	Internet Protocol Version 4, Src: 90.0.0.102 (90.0.0.102), Dst: 90.0.0.105 (90.0.0.105)
+	User Datagram Protocol, Src Port: italk (12345), Dst Port: 59568 (59568)
-	Data (17 bytes)
	Data: 40306566665a000066306566665a000066
	[Length: 17]

0000	00 25 86 ec b9 ba b4 b6	76 5e 41 a1 08 00 45 00	..%...... V^A...E.
0010	00 2d 3f c3 00 00 80 11	46 2e 5a 00 00 66 5a 00	.-?..... F.Z...fZ.
0020	00 69 30 39 e8 b0 00 19	8e 20 40 30 65 66 66 5a	..109.... . @0effz
0030	00 00 66 30 65 66 66 5a	00 00 66	..f0effz ..f

Update

Envio:

204	96.91063300	90.0.0.105	90.0.0.102	UDP	55	Source port: 59569	Destination port: italk
205	96.91747000	90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569

+	Frame 204: 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface 0
+	Ethernet II, Src: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba), Dst: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1)
+	Internet Protocol Version 4, Src: 90.0.0.105 (90.0.0.105), Dst: 90.0.0.102 (90.0.0.102)
+	User Datagram Protocol, Src Port: 59569 (59569), Dst Port: italk (12345)
-	Data (13 bytes)
	Data: 0334393331343933315a000069
	[Length: 13]

0000	b4 b6 76 5e 41 a1 00 25	86 ec b9 ba 08 00 45 00	..V^A...%E.
0010	00 29 36 42 00 00 80 11	4f b3 5a 00 00 69 5a 00	.)6B.... O.Z...iZ.
0020	00 66 e8 b1 30 39 00 15	f0 e0 03 34 39 33 31 34	..f..09.. ...49314
0030	39 33 31 5a 00 00 69		931Z..i

Resposta:

205	96.91747000	90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 59569
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+	Frame 205: 47 bytes on wire (376 bits), 47 bytes captured (376 bits) on interface 0
+	Ethernet II, Src: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1), Dst: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba)
+	Internet Protocol Version 4, Src: 90.0.0.102 (90.0.0.102), Dst: 90.0.0.105 (90.0.0.105)
+	User Datagram Protocol, Src Port: italk (12345), Dst Port: 59569 (59569)
-	Data (5 bytes)
	Data: 4334393331
	[Length: 5]

0000	00 25 86 ec b9 ba b4 b6	76 5e 41 a1 08 00 45 00	..%...... V^A...E.
0010	00 21 3f c4 00 00 80 11	46 39 5a 00 00 66 5a 00	..!?...... F9Z...fZ.
0020	00 69 30 39 e8 b1 00 0d	84 b2 43 34 39 33 31	..i09.... ..C4931

Leave

Envio:

22	6.249909000	90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 60426
23	6.250816000	90.0.0.105	90.0.0.102	UDP	63	Source port: 60427	Destination port: italk

+	Frame 22: 47 bytes on wire (376 bits), 47 bytes captured (376 bits) on interface 0
+	Ethernet II, Src: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1), Dst: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba)
+	Internet Protocol Version 4, Src: 90.0.0.102 (90.0.0.102), Dst: 90.0.0.105 (90.0.0.105)
+	User Datagram Protocol, Src Port: italk (12345), Dst Port: 60426 (60426)
-	Data (5 bytes)
	Data: 4130656666
	[Length: 5]

0000	00 25 86 ec b9 ba b4 b6	76 5e 41 a1 08 00 45 00	..%...... V^A...E.
0010	00 21 44 7f 00 00 80 11	41 7e 5a 00 00 66 5a 00	..!D..... A~Z...fZ.
0020	00 69 30 39 ec 0a 00 0d	22 2a 41 30 65 66 66	..i09.... ""A0eff

Resposta:

22	6.249909000	90.0.0.102	90.0.0.105	UDP	47	Source port: italk	Destination port: 60426
23	6.250816000	90.0.0.105	90.0.0.102	UDP	63	Source port: 60427	Destination port: italk
+ Frame 23: 63 bytes on wire (504 bits), 63 bytes captured (504 bits) on interface 0							
+ Ethernet II, Src: Tp-LinkT_ec:b9:ba (00:25:86:ec:b9:ba), Dst: IntelCor_5e:41:a1 (b4:b6:76:5e:41:a1)							
+ Internet Protocol Version 4, Src: 90.0.0.105 (90.0.0.105), Dst: 90.0.0.102 (90.0.0.102)							
+ User Datagram Protocol, Src Port: 60427 (60427), Dst Port: italk (12345)							
- Data (21 bytes)							
Data: 0134393331306566665a000066306566665a000066							
[Length: 21]							

0000	b4	b6	76	5e	41	a1	00	25	86	ec	b9	ba	08	00	45	00	..v^A..%E.
0010	00	31	63	f0	00	00	80	11	21	fd	5a	00	00	69	5a	00	.1c..... !.Z. iz.
0020	00	66	ec	0b	30	39	00	1d	5f	56	01	34	39	33	31	30	.f..09.. _v.49310
0030	65	66	66	5a	00	00	66	30	65	66	66	5a	00	00	66		effz..f0 effz..f