

*Mikro**T**ik.Me*

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# MikroTik.Me

- Васильев Кирилл
- Санкт-Петербург
- Курсы MikroTik
- Поддержка



# **SIP Helper в RouterOS**

# SIP Helper в RouterOS

- Сложные протоколы и RouterOS
- Основные принципы работы SIP
- Прохождение SIP протокола через NAT
- Asterisk и SIP
- RouterOS и SIP Service / Helper / ALG

# Сложные протоколы

- Требуют создания дополнительного соединения
- Принимающая сторона указывает порты и ip адреса, на которые ожидается соединение
- Популярные сложные протоколы:
  - pptp
  - ftp
  - sip
  - tftp

# Сложные протоколы

- Маршрутизатор анализирует пакеты сложных протоколов
- Изменяет содержимое на «правильные» значения
- Создаёт новое соединение с параметрами из информации, полученной из пакета

# Сложные протоколы

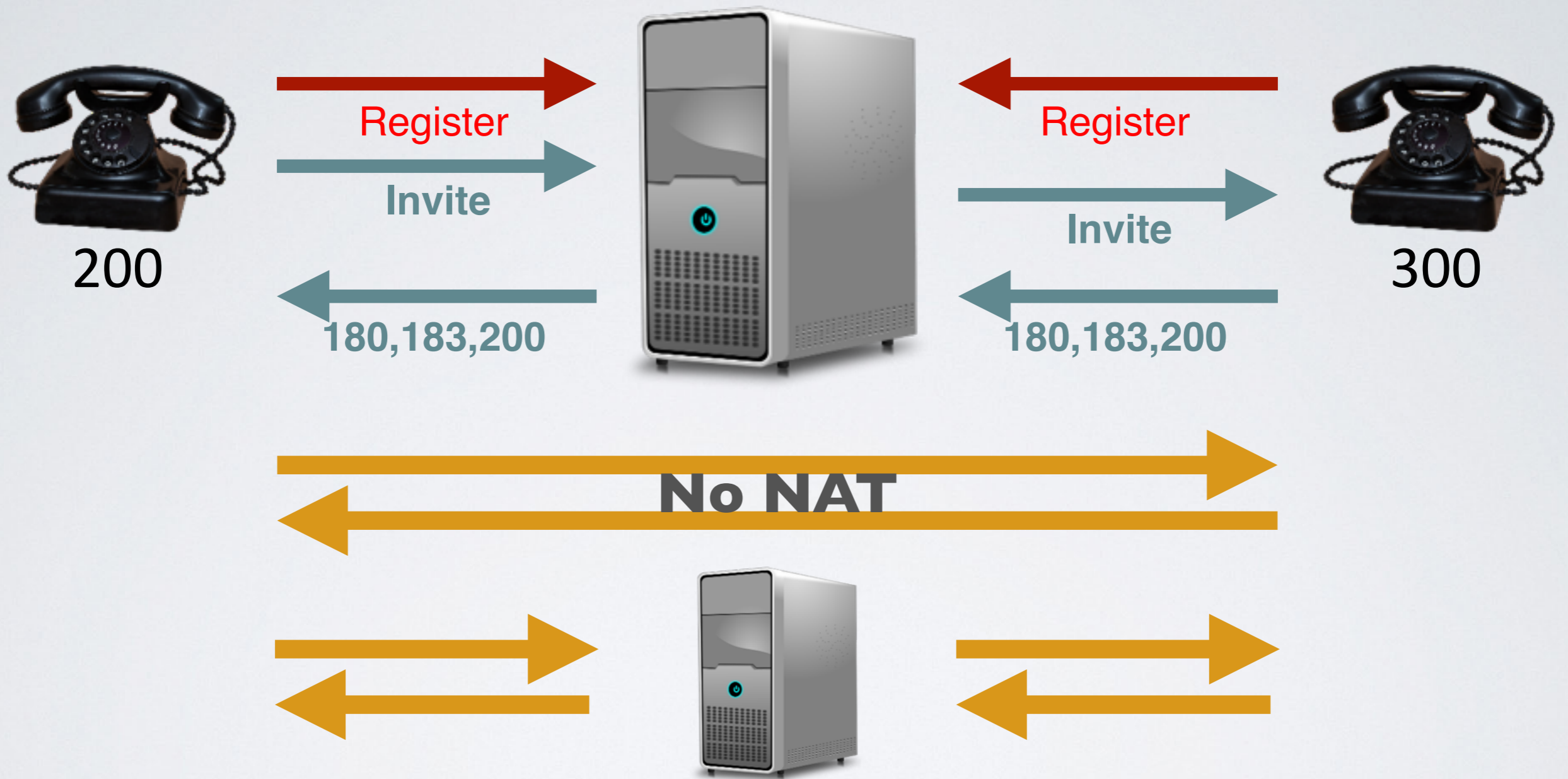
- Application-level gateway (ALG)
- NAT Helper
- /ip firewall **service-port**

# SIP

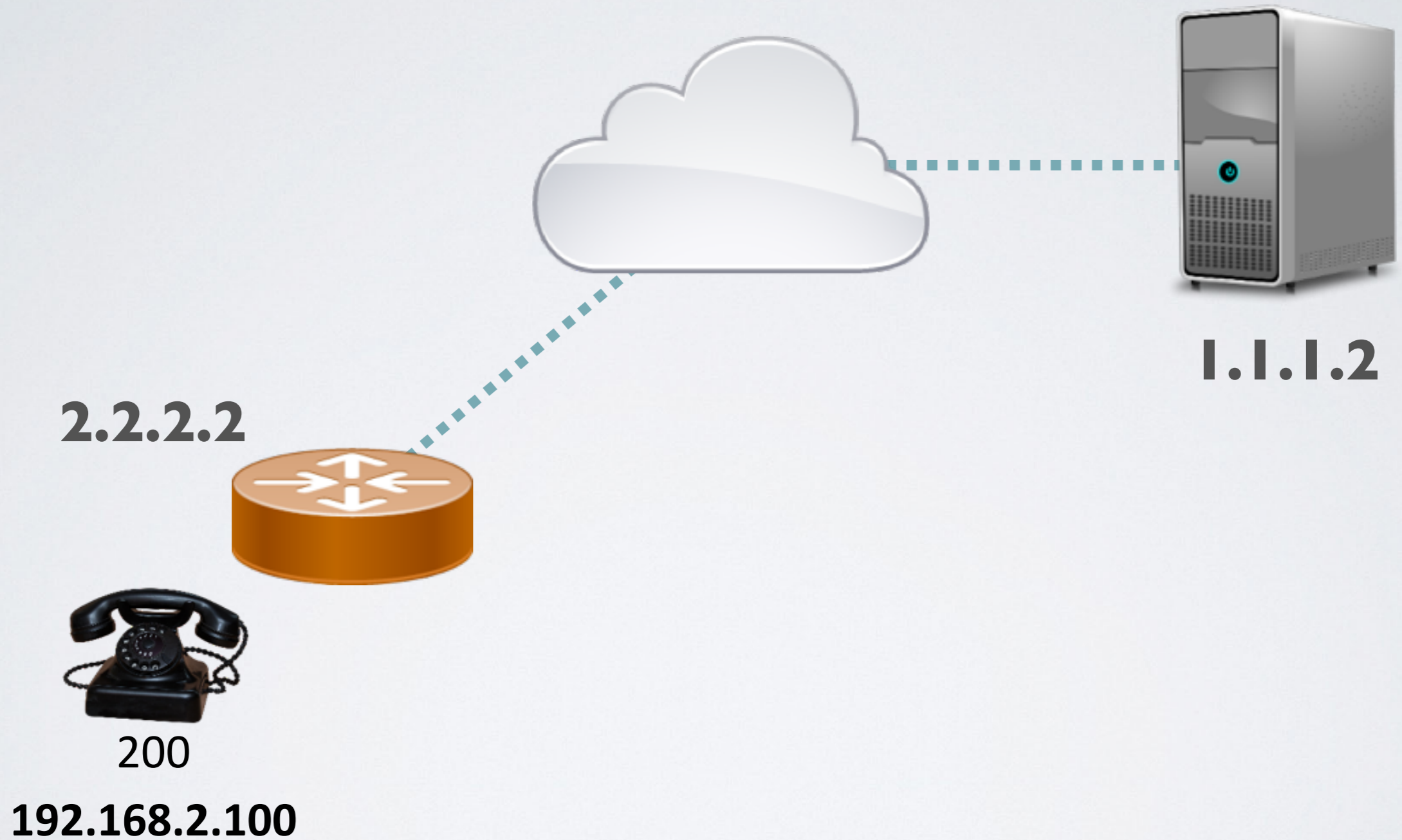
- Session Initiation Protocol
- Похож на HTTP
- Актуальная версия 2.0
- Коды ответа
- Как транспорт для SDP (Session Description Protocol)
- TCP/UDP
- TLS



# SIP



# SIP Helper Disabled



# SIP Helper Disabled

```
[admin@2.2.2.2] >
```

```
/ip firewall nat
```

```
add action=masquerade chain=srcnat out-interface=ether1
```

```
add chain=dstnat src-address=1.1.1.2 protocol=udp \
```

```
dst-port=5060,10000-20000 in-interface=ether1 \
```

```
action=dst-nat to-addresses=192.168.2.100
```

```
/ip firewall service-port
```

```
set sip disabled=yes
```

# SIP Disabled / Prerouting

Internet Protocol Version 4, Src: 192.168.2.100, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5060, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

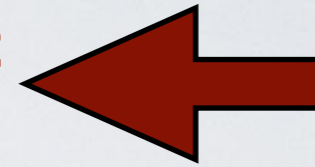
Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Prerouting

Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (INVITE)



Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

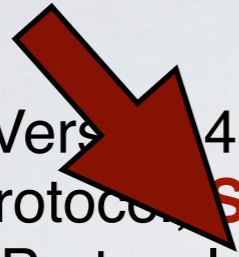
Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Prerouting



Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (**INVITE**)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Prerouting

Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (**INVITE**)

Request-Line: INVITE sip:**89052073578@1.1.1.2**;u SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Prerouting

Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (**INVITE**)

Request-Line: INVITE sip:**89052073578@1.1.1.2**;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **192.168.2.100:5060**;branch=1;transport=udp;message-id=<G4bK88046350326731848@192.168.2.100>

From: 200 <sip:200@1.1.1.2:5060>;tag=311510759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101



# SIP Disabled / Prerouting

Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (**INVITE**)

Request-Line: INVITE sip:**89052073578@1.1.1.2**;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **192.168.2.100:5060**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

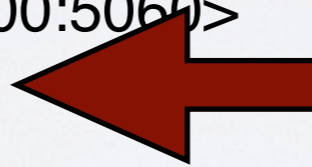
Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: **application/sdp**

Content-Length: 283



Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Prerouting

Internet Protocol Version 4, **Src: 192.168.2.100, Dst: 1.1.1.2**

User Datagram Protocol, **Src Port: 5060, Dst Port: 5060**

Session Initiation Protocol (**INVITE**)

Request-Line: INVITE sip:**89052073578@1.1.1.2**;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **192.168.2.100:5060**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: **application/sdp**

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 37919671 312189059 IN IP4 **192.168.2.100**

Session Name (s): A conversation

Connection Information (c): IN IP4 **192.168.2.100**

Time Description, active time (t): 0 0

Media Description, name and address (m): audio **10036** RTP/AVP 8 0 9 18 101

# SIP Disabled / SRCNAT

Internet Protocol Version 4, Src: 2.2.2.2, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / SRCNAT



Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / SRCNAT

Internet Protocol Version 4, **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:**5060**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Disabled / Server

- Включить поддержку на телефоне RFC3581 (rport)
- На сервере установить значение nat=**comedia**
- Если телефон не поддерживает rport
- На сервере установить значение nat=**force\_rport,comedia**

# Server force\_rport

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dest Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:**5060**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP + NAT = КОМЕДИЯ

Internet Protocol Version 4, Src: 2.2.2.2, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

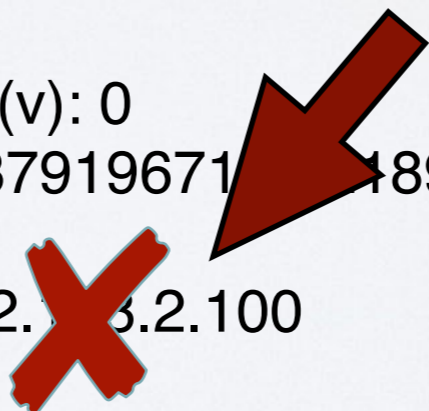
Owner/Creator, Session Id (o): 200 837919671 189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101





# SIP + NAT = КОМЕДИЯ

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP + NAT = КОМЕДИЯ

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 192.168.2.100:5060;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@192.168.2.100:5060>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 192.168.2.100

Session Name (s): A conversation

Connection Information (c): IN IP4 192.168.2.100

Time Description, active time (t): 0 0

Media Description, name and address (m): audio **10036** RTP/AVP 8 0 9 18 101

# SIP Helper Disabled

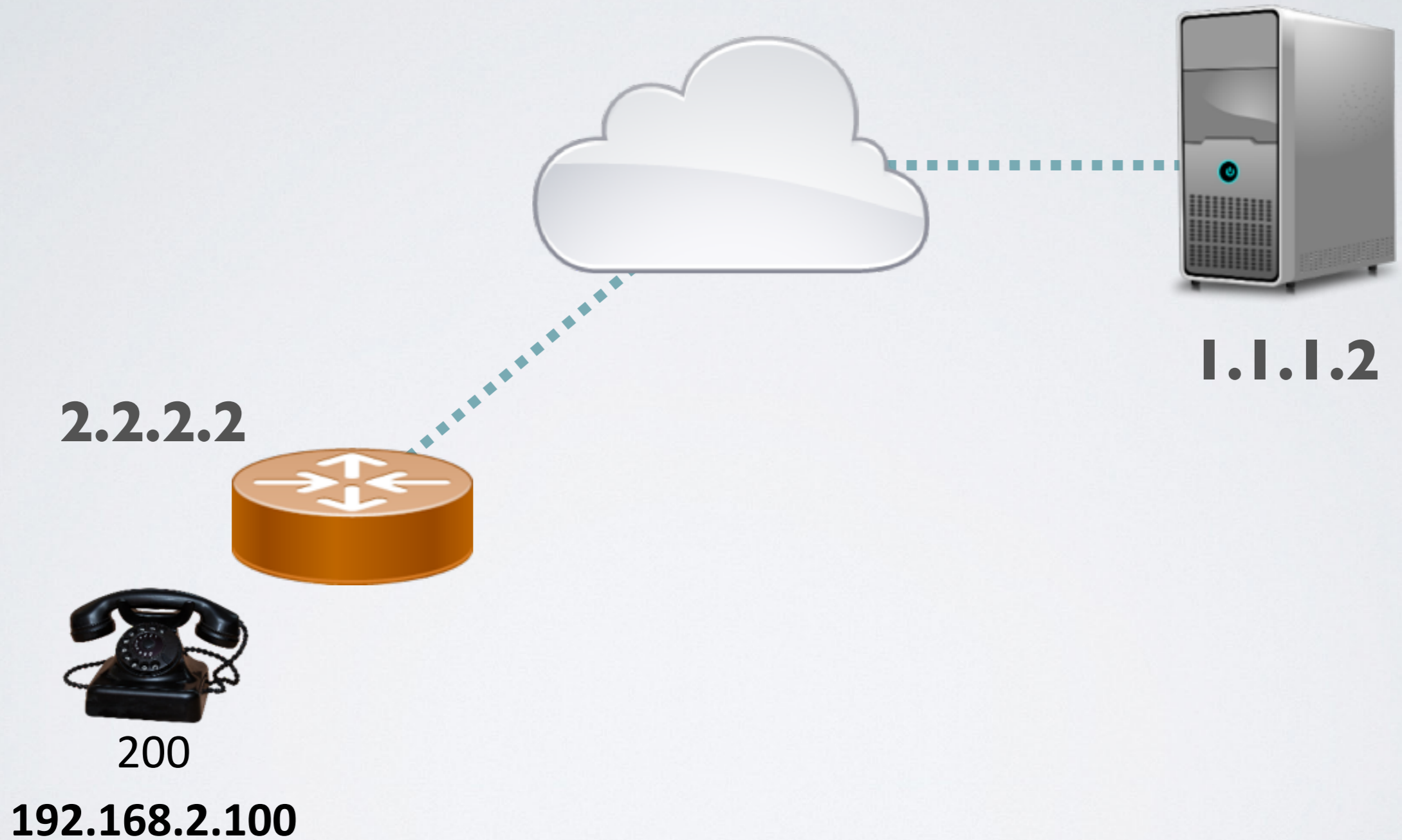
- Простая конфигурация для одного клиента
- «Пробрасываем» порты dst-nat на маршрутизаторе
- Все остальные настройки можно сделать со стороны сервера

# Что будем делать?



# SIP Helper

# SIP Helper



# SIP Helper

```
[admin@2.2.2.2] >
```

```
/ip firewall nat
```

```
add action=masquerade chain=srcnat out-interface=ether1
```

```
/ip firewall service-port
```

```
set sip disabled=no
```

# SIP Helper Регистрация

- Сообщение REGISTER
- Если в сообщении есть поле **Expires** со значением больше чем 0, то RouterOS создаст соединение с timeout из **sip-timeout** значения service-port (Только для UDP)
- Если Expires **отсутствует или равно 0**, то существующее соединение **удаляется** из трекера



# SIP Helper Prerouting

Internet Protocol Version 4, Src: 192.168.2.100, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5060, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **192.168.2.100:5060**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885736167-282092668217063@**192.168.2.100**

CSeq: 1 INVITE

Contact: <sip:200@**192.168.2.100:5060**>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 **192.168.2.100**

Session Name (s): A conversation

Connection Information (c): IN IP4 **192.168.2.100**

Time Description, active time (t): 0 0

Media Description, name and address (m): audio **10036** RTP/AVP 8 0 9 18 101

# SIP Helper Action

Internet Protocol Version 4, Src: 2.2.2.2, Dst: 1.1.1.2

User Datagram Protocol, Src Port: 5061, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP 2.2.2.2:5061;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@2.2.2.2:5061>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 2.2.2.2

Session Name (s): A conversation

Connection Information (c): IN IP4 2.2.2.2

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Helper Action

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **2.2.2.2:5061**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@192.168.2.100

CSeq: 1 INVITE

Contact: <sip:200@2.2.2.2:5061>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 2.2.2.2

Session Name (s): A conversation

Connection Information (c): IN IP4 2.2.2.2

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Helper Action

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **2.2.2.2:5061**;branch=z9hG4K38046350326721118

From: 200 <sip:200@1.1.1.2:5060>;tag=311911159

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@**192.168.2.100**

CSeq: 1 INVITE

Contact: <sip:200@2.2.2.2:5061>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

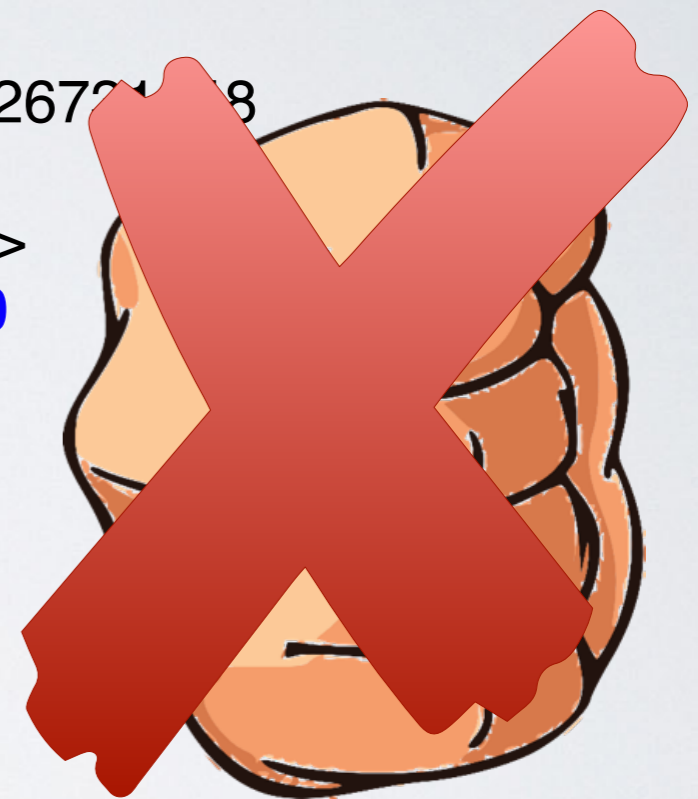
Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 2.2.2.2

Session Name (s): A conversation

Connection Information (c): IN IP4 2.2.2.2

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101



# SIP Helper Action

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **2.2.2.2:5061**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@**192.168.2.100**

CSeq: 1 INVITE

Contact: <sip:200@**2.2.2.2:5061**>

Content-Type: application/sdp

Content-Length: 1000

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 2.2.2.2

Session Name (s): A conversation

Connection Information (c): IN IP4 2.2.2.2

Time Description, active time (t): 0 0

Media Description, name and address (m): audio 10036 RTP/AVP 8 0 9 18 101

# SIP Helper Action

Internet Protocol Version 4, Src: **2.2.2.2**, Dst: 1.1.1.2

User Datagram Protocol, Src Port: **5061**, Dst Port: 5060

Session Initiation Protocol (INVITE)

Request-Line: INVITE sip:89052073578@1.1.1.2;user=phone SIP/2.0

Message Header

Via: SIP/2.0/UDP **2.2.2.2:5061**;branch=z9hG4bK88046350326731848

From: 200 <sip:200@1.1.1.2:5060>;tag=311910759

To: "89052073578" <sip:89052073578@1.1.1.2;user=phone>

Call-ID: 2885320736167-282092668217063@**192.168.2.100**

CSeq: 1 INVITE

Contact: <sip:200@**2.2.2.2:5061**>

Content-Type: application/sdp

Content-Length: 283

Message Body

Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 2837919671 312189059 IN IP4 **2.2.2.2**

Session Name (s): A conversation

Connection Information (c): IN IP4 **2.2.2.2**

Time Description, active time (t): 0 0

Media Description, name and address (m): audio **10036** RTP/AVP 8 0 9 18 101

# SIP Helper Action

## Message Body

### Session Description Protocol

Session Description Protocol Version (v): 0

Owner/Creator, Session Id (o): 200 837919671 312189059 IN IP4 **2.2.2.2**

Session Name (s): A conversation

Connection Information (c): IN IP4 **2.2.2.2**

Time Description, active time (t): 0 0

Media Description, name and address (m): audio **10036** RTP/AVP 8 0 9 18 101

Когда SIP Helper получит ответ от сервера с портом и адресом для RTP трафика.

!!!Создаст соединение в conntrack с правильными адресами и портами для трансляции nat!!!

DST-NAT не нужен!

# SIP Direct Media

- Позволяет пересылать медиа напрямую между клиентами



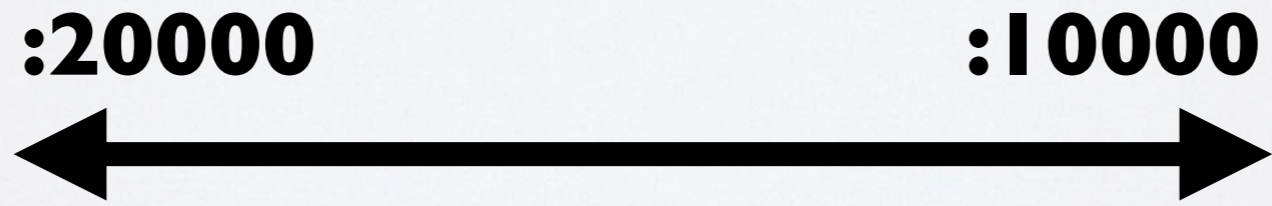
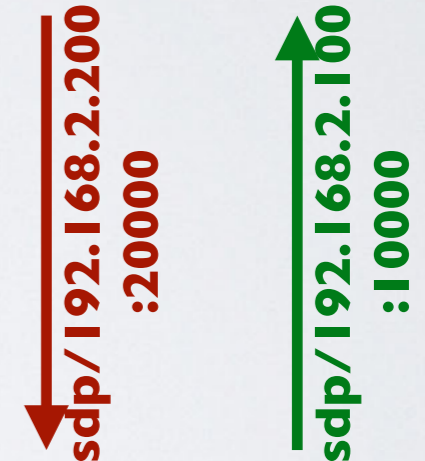
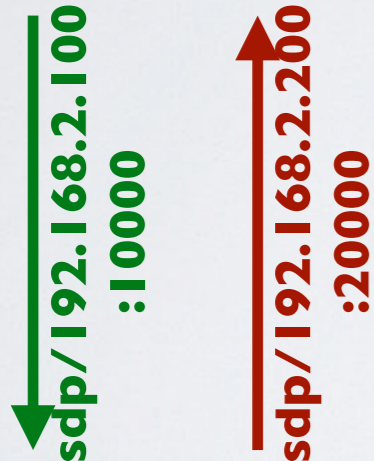
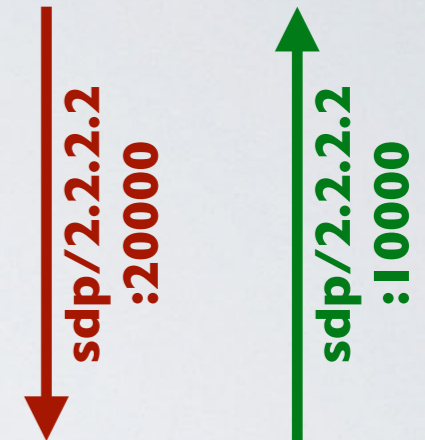
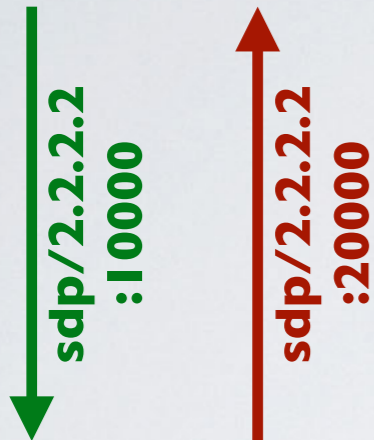


1.1.1.2

2.2.2.2



192.168.2.1



192.168.2.200



192.168.2.100

# SIP Helper VPN

# SIP Helper VPN

«Был freebrix, хотим voip в филиале, но слышимость **ТОЛЬКО В ОДНУ сторону**, на форумах пишут, что **надо отключить sip helper**»

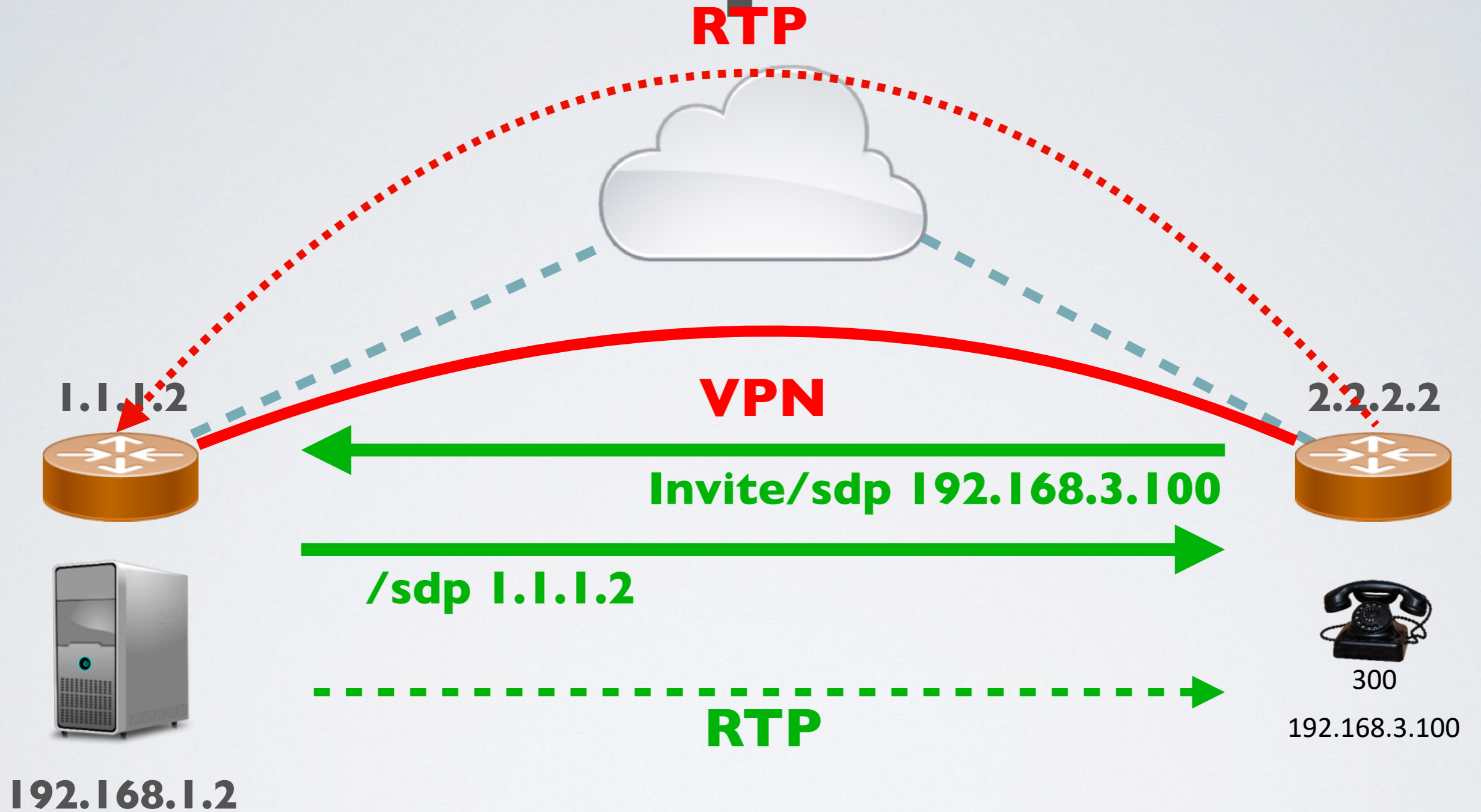
«Я не помню, что точно делал, но «тыкал» всё подряд, отключал sip helper, в пользователях менял параметры nat»

«Неделю пытаюсь настроить, на форуме предложили **поменять маршрутизатор**»

«Меня уволят!»

«Шо делать?»

# SIP Helper VPN



# SIP Helper VPN

А причем тут **MikroTiK** и SIP Helper?

Куда телефону указали отправлять медиа, туда он  
и отправляет!

# SIP Helper VPN

- Asterisk – смотрит, если сеть не объявлена в переменной **localnet**, определяет, что клиент находится за NAT и использует свой внешний адрес (**externalip**), как адрес для в SIP/SDP
- Клиент отправляет на хост указанный в SIP/SDP

# SIP Helper VPN

- localnet = 192.168.2.0/255.255.255.0

NAT <sup>?</sup>

yes

no

never

route

IP Configuration <sup>?</sup>

Public IP

Static IP

Dynamic IP

External IP <sup>?</sup>

Local Networks <sup>?</sup>

Auto Configure

Add Local Network Field

# SIP Helper



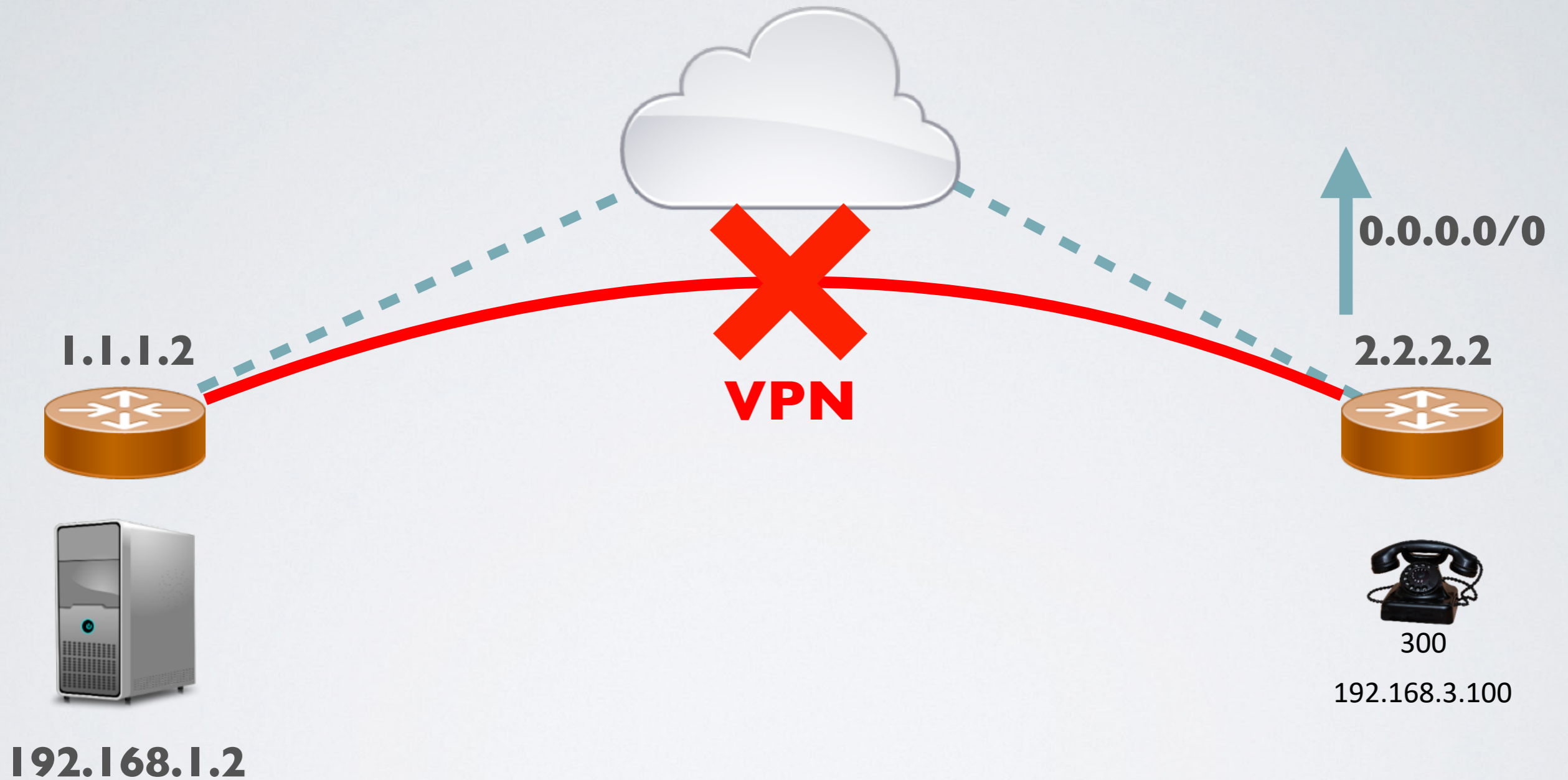
**Отключайте NAT  
На клиентах и транках**

**Включайте NAT  
force\_rport и comedia**

**Выбирайте что-то одно!**



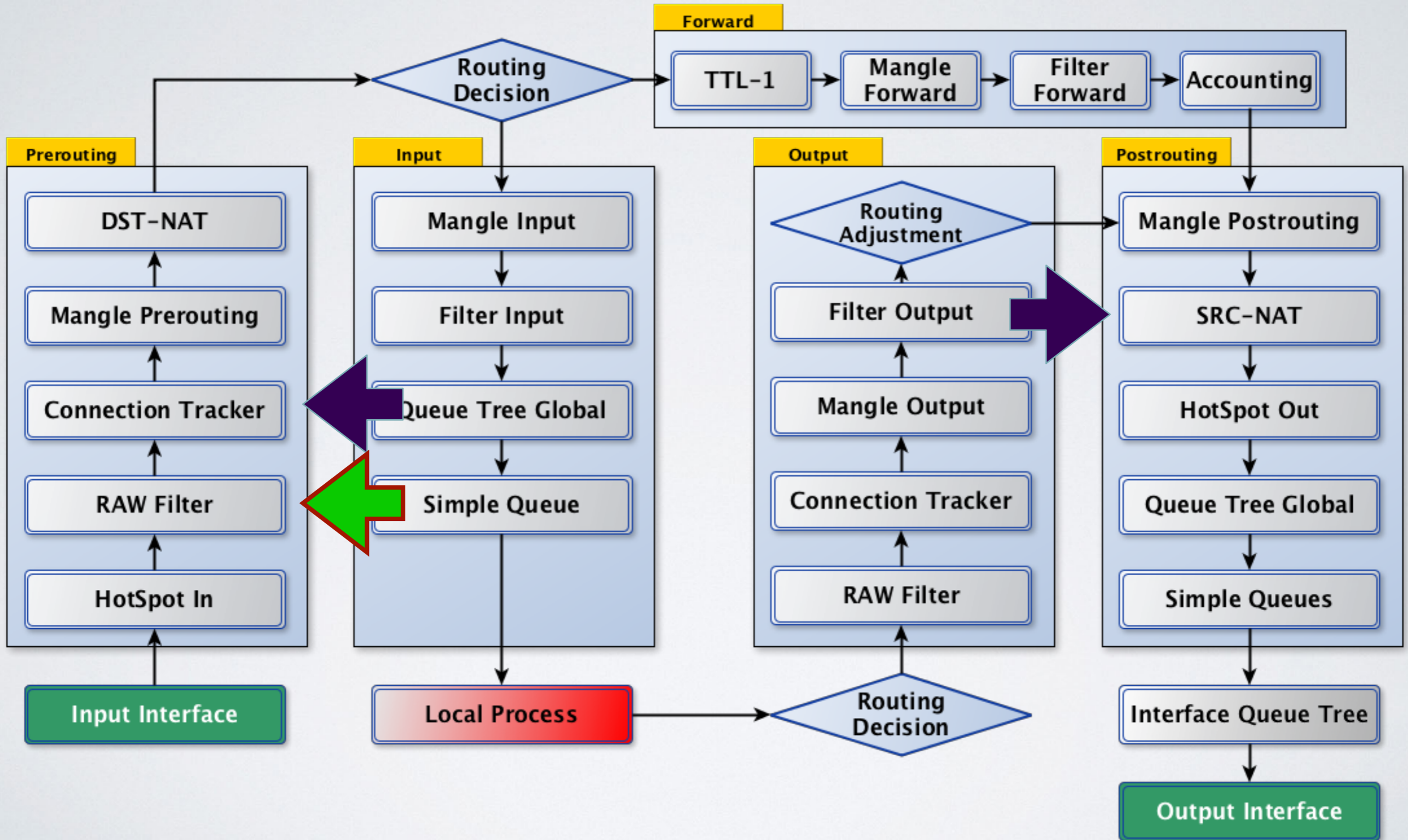
# SIP via VPN



# SIP via VPN

- Исключите из NAT-а
- Запретите трафик до SIP сервера, через ISP

# NO NAT



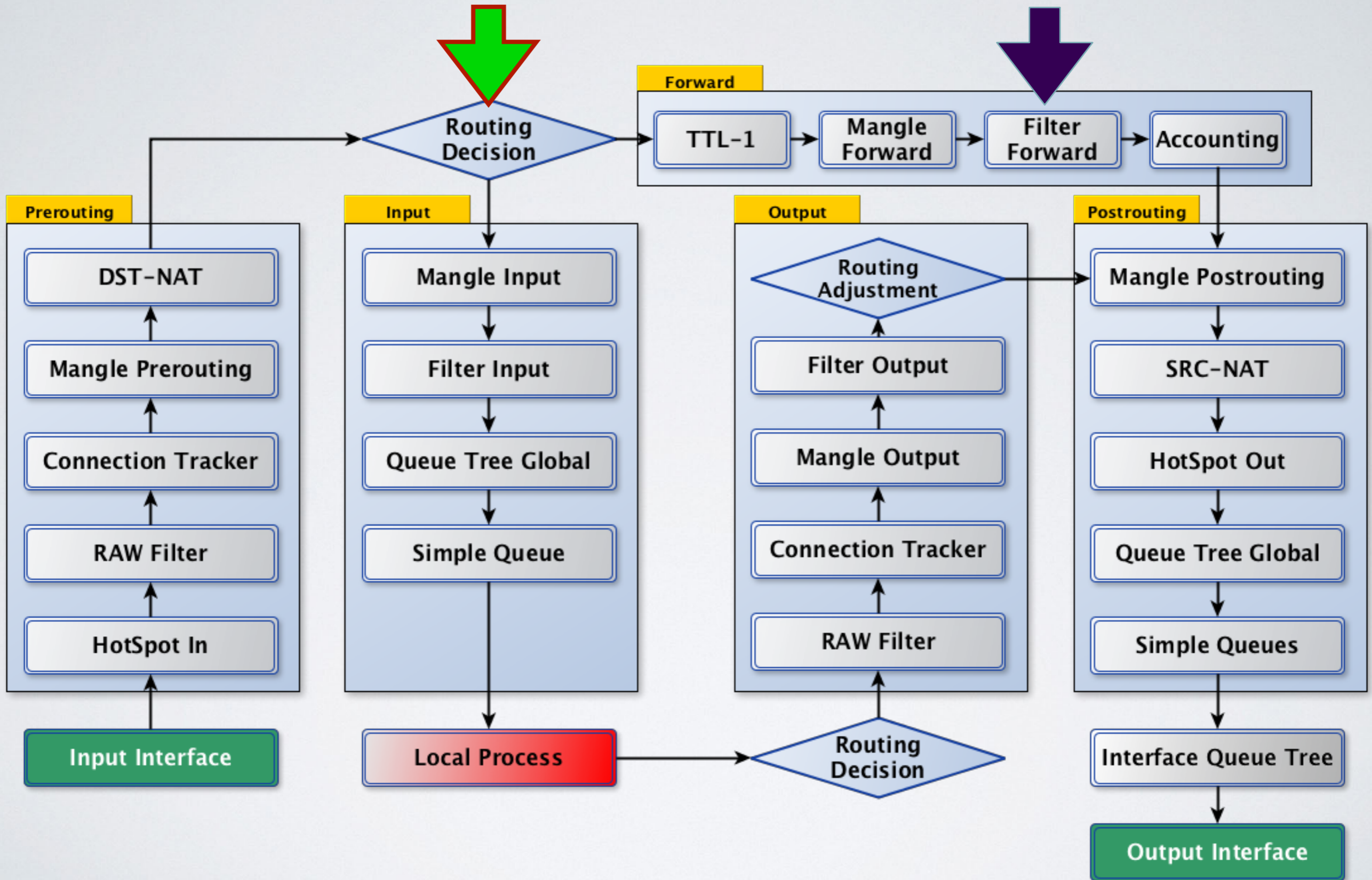
# NO NAT

```
[admin@2.2.2.2] >
```

```
/ip firewall raw
```

```
add chain=prerouting in-interface=Brdige-local \  
dst-address=192.168.1.0/24 action=notrack
```

# No Forward



# No Forward

```
[admin@2.2.2.2] >
```

```
/ip route
```

```
add dst-address=192.168.0.0/16 type=unreachable distance=250
```

```
add dst-address=10.0.0.0/8 type=unreachable distance=250
```

```
add dst-address=172.16.0.0/12 type=unreachable distance=250
```

```
.....
```

# Хочу всё знать

- <https://git.kernel.org>
- v3.3.5
- net/netfilter/nf\_conntrack\_sip.c

# Вопросы?

- MikroTik.Me
- VasilevKirill.com
- <https://t.me/mikrotikme>
- <https://vk.com/mikrotikrus>