Functionality of STUN/TURN

Standard protocols to ensure the media stream

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STUN/TURN

Ensuring the RTP Stream

Functionality of "Direct-RTP"

- Signaling is usually not a challenge, even if the servers are located outside the local network.

- If clients are on the same network, the exchange of RTP data is also not a problem, as they can reach each other.

- The clients determine their local IP addresses, communicate them to each other, and send the RTP packets there.

PBX/
Webserver

Corporate LAN

RTP

IPv6 Address	5bb2:.....:8129
Temporary IPv6	5bb2:.... :8532
Link-local IPv6	fe74: :8129
IPv4 Address	**192.168.0.1:9645**

IPv6 Address	2a02:.....:8549
Temporary IPv6	2a02:.... :5907
Link-local IPv6	fe80: :8549
IPv4 Address	**192.168.0.9:4473**

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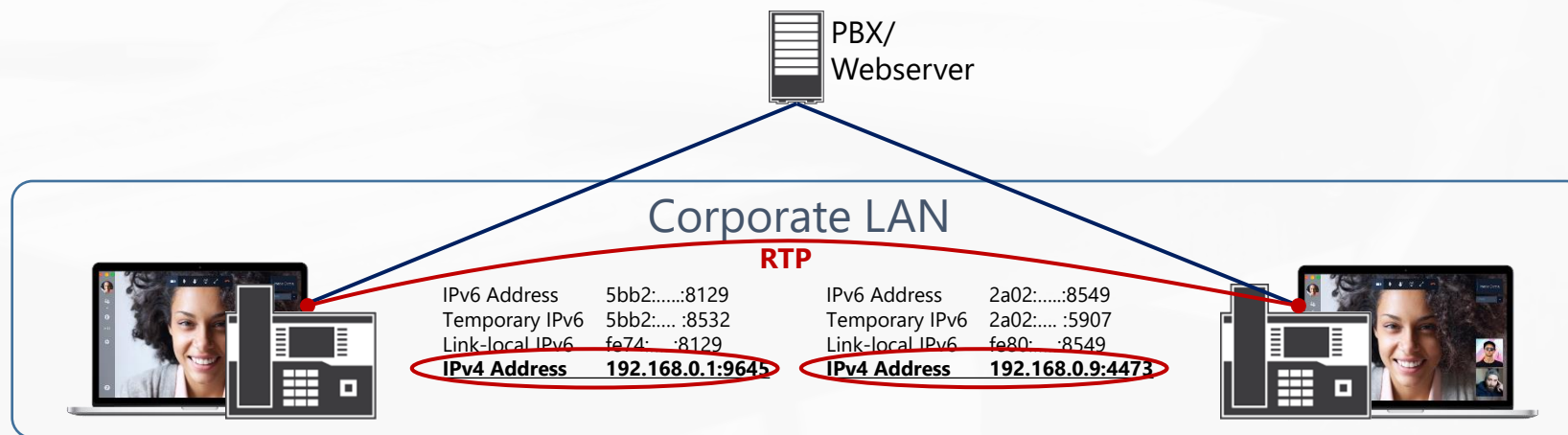
The "Direct-RTP" Challenge

- But what if direct communication is not possible, e.g. because the users are in the home office and each has their own router?

- The local addresses determined by the clients cannot be reached among each other.

  ➤ This is where the STUN server comes into play!
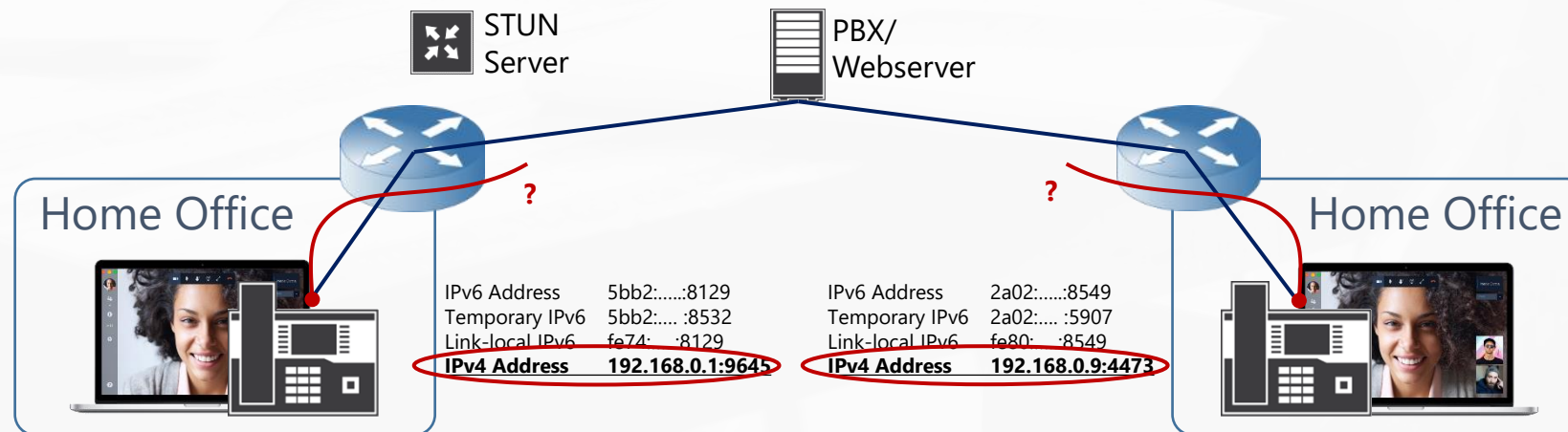
How the STUN Server works

- The client sends a STUN request to the STUN server: "What is my public IP address:port".

- The STUN server takes the router's IP address:port from the IP header and sends this information back.

- The client adds these to its previously determined IP addresses.

STUN
Server

Home Office

IPv6 Address   5bb2:.....:8129
Temporary IPv6   5bb2:.... :8532
Link-local IPv6   fe74:.....:8129
IPv4 Address   192.168.0.1:9645
Router IP (STUN)   8.7.6.127:16147

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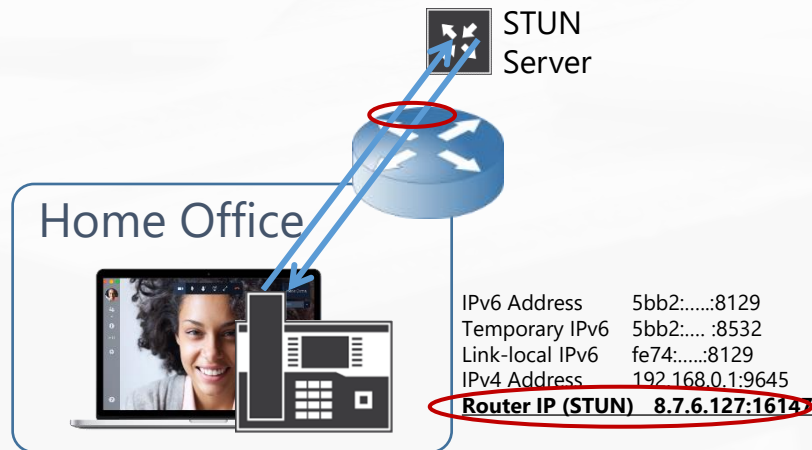
How the STUN Server works

- The STUN request is made by both clients and thus both know their public IP addresses: ports for communication.

- The RTP stream is sent to the other public IP address: port.

- Since most routers don't change the public ports even if the internal port remains the same, communication works.
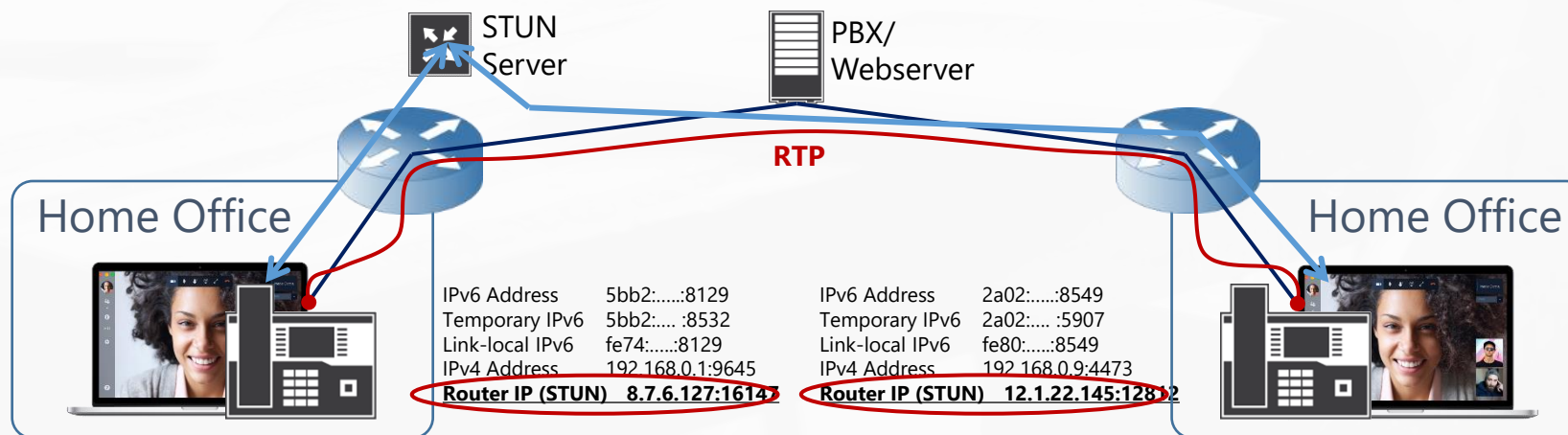
The STUN Challenge

- But what if the routers don't support it after all ("Restricted NAT"), or a firewall blocks the communication??

  ➢ The TURN server always helps!

STUN Server

PBX/ Webserver

TURN Server

Home Office

RTP

?

?

Home Office

IPv6 Address	5bb2:.....:8129
Temporary IPv6	5bb2:.... :8532
Link-local IPv6	fe74:.....:8129
IPv4 Address	192.168.0.1:9645
Router IP (STUN)	**8.7.6.127:16147**

IPv6 Address	2a02:.....:8549
Temporary IPv6	2a02:.... :5907
Link-local IPv6	fe80:.....:8549
IPv4 Address	192.168.0. 9:4473
Router IP (STUN)	**12.1.22.145:12812**

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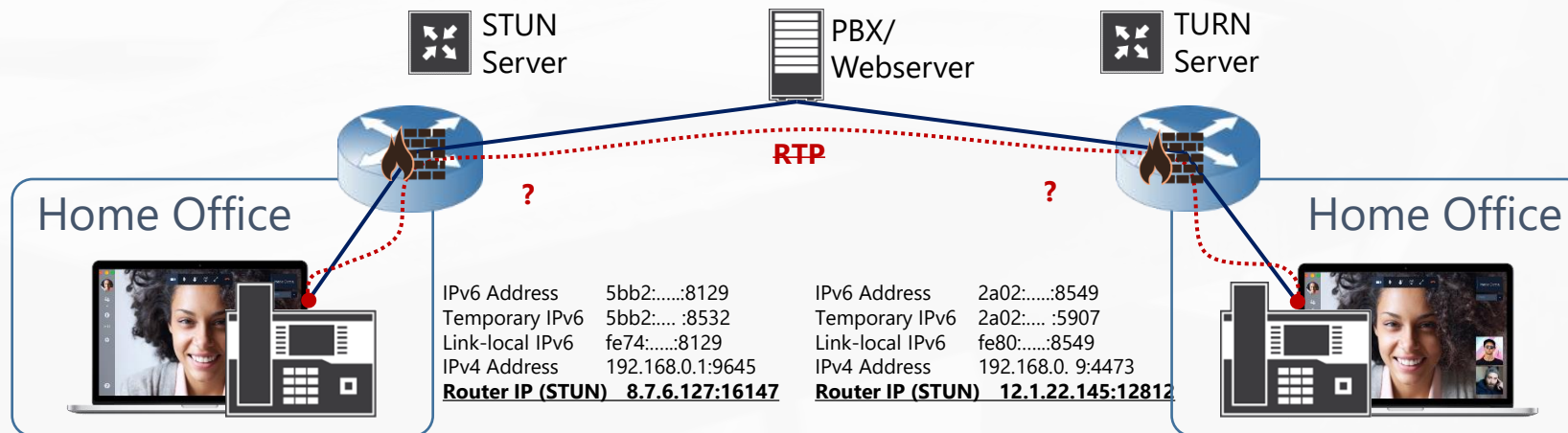
Functionality of the TURN Server

- The client sends a session request to the TURN server.

- The TURN server creates and reserves a unique session ID and returns it to the client.

- The client adds the TURN Server IP together with the session ID to its previously determined IP addresses.

Session ID

TURN
Server

Home Office

IPv6 Address	2a02:.....:8549
Temporary IPv6	2a02:.... :5907
Link-local IPv6	fe80:.....:8549
IPv4 Address	192.168.0. 9:4473
Router IP (STUN)	12.1.22.145:12812
TURN IP + ID	**4.2.3.1 ID:gh9$#2**

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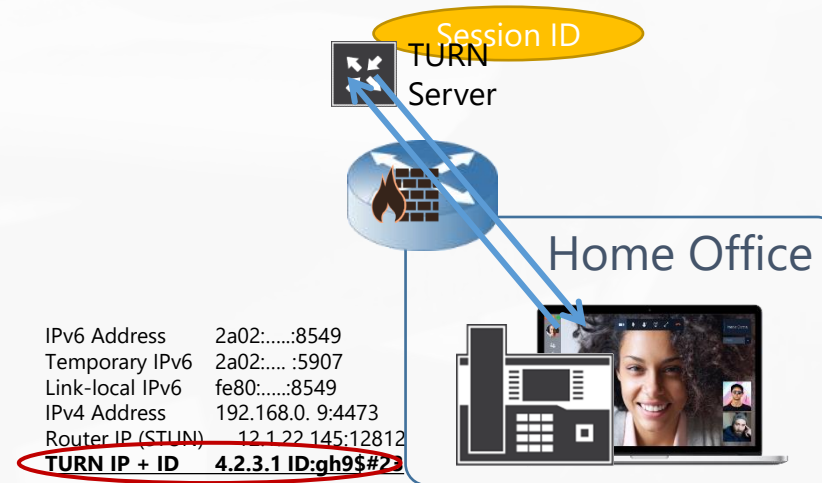
Functionality of the TURN Server

- The TURN request is made by both clients and thus both have a session ID.

- Both clients send their RTP streams with the session ID to the TURN server, which can assign and connect it based on the session IDs.

- The RTP stream is also encapsulated and is always sent to port 3478.
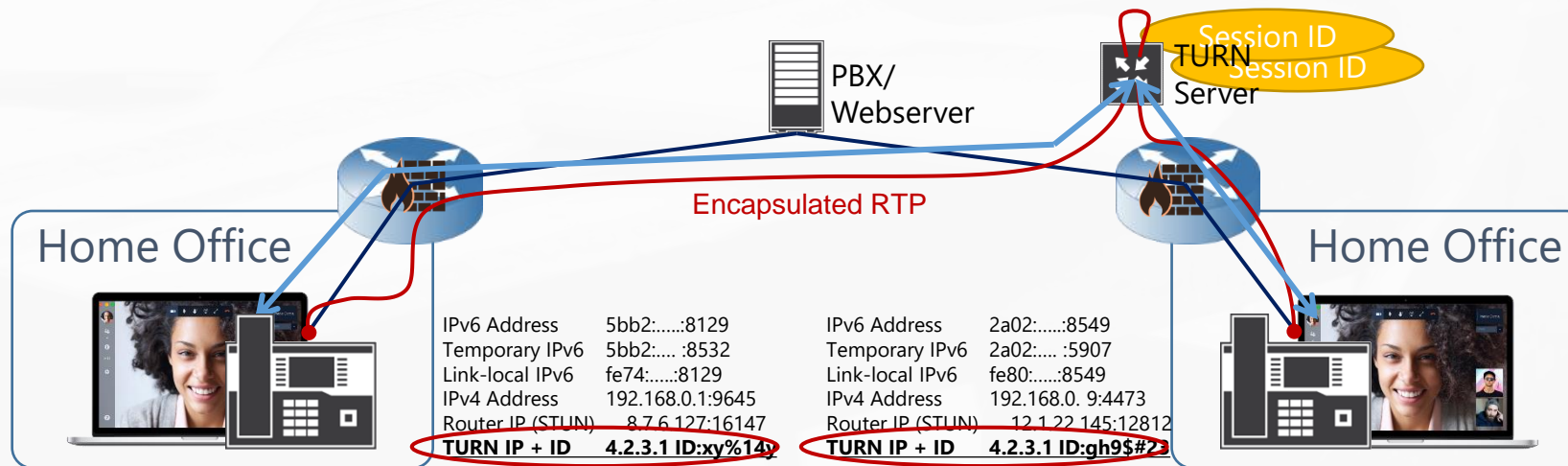
Functionality of the TURN Server

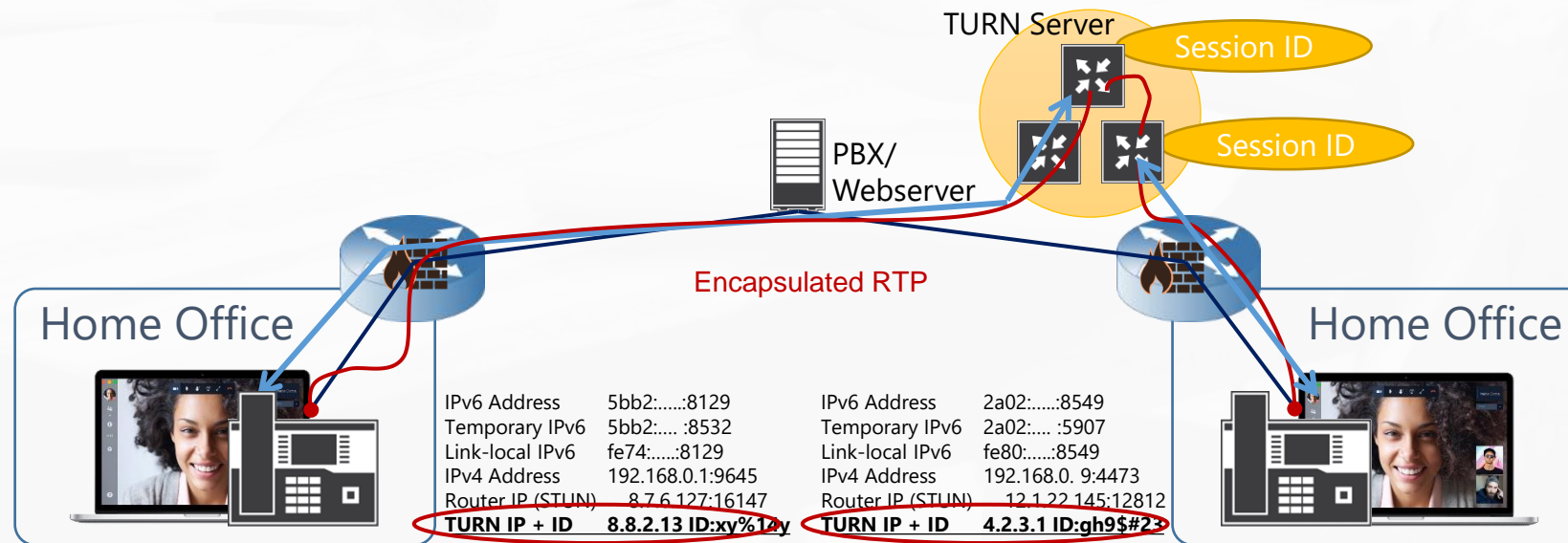- Several different TURN servers can be used, but they must reach each other, internally an RTP port range is used.

- This RTP port range can also be used directly by the clients.

TURN Server

Session ID

Session ID

PBX/
Webserver

Encapsulated RTP

Home Office

Home Office

IPv6 Address	5bb2:.....:8129		IPv6 Address	2a02:.....:8549
Temporary IPv6	5bb2:.... :8532		Temporary IPv6	2a02:.... :5907
Link-local IPv6	fe74:.....:8129		Link-local IPv6	fe80:.....:8549
IPv4 Address	192.168.0.1:9645		IPv4 Address	192.168.0. 9:4473
Router IP (STUN)	8.7.6.127:16147		Router IP (STUN)	12.1.22.145:12812
TURN IP + ID	**8.8.2.13 ID:xy%1#y**		**TURN IP + ID**	**4.2.3.1 ID:gh9$#2**

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Conclusion: STUN and TURN guarantee the RTP stream

- STUN and TURN can also run on the same server (both port 3478).

- The process is resource-saving, as the "RTP Relay" on the TURN server is only used when there is no other way.

- STUN and TURN Server are very easy to set up, as no individual configuration is necessary (only User+PW on the TURN Server).

STUN Server

PBX/ Webserver

TURN Server

Encapsulated RTP

Home Office

Home Office

IPv6 Address	5bb2:.....:8129
Temporary IPv6	5bb2:.... :8532
Link-local IPv6	fe74:.....:8129
IPv4 Address	192.168.0.1:9645
Router IP (STUN)	8.7.6.127:16147
TURN IP + ID	4.2.3.1 ID:xy%14y

IPv6 Address	2a02:.....:8549
Temporary IPv6	2a02:.... :5907
Link-local IPv6	fe80:.....:8549
IPv4 Address	192.168.0. 9:4473
Router IP (STUN)	12.1.22.145:12812
TURN IP + ID	4.2.3.1 ID:gh9$#23

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Thank you for your attention