qmtunnel Documentation

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Note: Please keep in mind that both qmTunnel and documentation are under development now. You can only use it on your own risk.

If you wish to use it in production environment, consider using our commercial support service to ensure better experience and support the project financially.

CHAPTER 1

Introduction

qmTunnel is a free cross-platform open source tunneling software allowing you to wrap up and tunnel all types of TCP, UDP or named pipe connections through a set of tunnel software servers.

You may find qmTunnel useful if you need (all features are optional):

- to secure your connection with SSL/TLS;
- to connect to hosts/networks behind NAT/firewall;
- to compress your traffic;
- to detect silent packet drops and disconnections (by enabling heartbeats);
- to allow short-time disconnections between tunnel hosts with no application disconnections;
- to add additional authentication level to tunnel hosts;
- to automatically re-establish the tunnel on disconnections (permanent tunnel);
- to establish tunnel only when needed (on demand).

Basically your application client connects to qmTunnel server instead of connecting directly to application server. Then qmTunnel server makes further connections to next qmTunner server and the last qmTunnel server in chain connects to your application server, transparently (for application client and server) transferring all application data from application client to the application server (and vice versa) and allowing to secure and tune the connections between qmTunnel servers.

How it works

The most simple case can be illustrated by the following figure:

When tunnel is configured on «host A», the connection is established in the following order:

1. Application client connects to local (on the same node or network) qmTunnel server on specified TCP or UDP port «X» on «host A».



Fig. 1.1: A simple tunnel through two hosts

- 2. qmTunnel server on «host A» connects to qmTunnel server on «host B» and establishes encrypted (SSL/TLS) connection.
- 3. qmTunnel server on «host B» connects to local (same node or network) application server on specified TCP or UDP port «Y». *«X» might be the same as «Y», or not.*
- 4. All the data transmitted by the application client will be delivered through the tunnel to the application server and vice versa.

Application might be any application or service using TCP, UDP or Unix sockets. For example:

- E-mail (SMTP, POP3, IMAP)
- Databases or data storages (MySQL, PostgreSQL, Oracle, SQL Server, etc.)
- Remote desktop and shell (VNC, RDP, SSH, etc.)
- DNS
- any other

In case you need to provide tunnel access to your LAN it's possible to do so:

It's also possible that host «B» is not available from the Internet and can't accept incoming connections, e.g. located behind NAT/firewall or doesn't have real IP address or domain name. In this case «remote» (or «reverse») tunnel can help:

«Remote» (or «reverse») tunnel means that it's «host B» who initiates the connection to «host A», and also the tunnel needs to be initiated on «host B» instead of «host A».

The next possible scenario is that both application client and server are behind NAT/firewall and incoming connections can't be accepted from outside. In this case you will need a third host acting as communication server/proxy:

In this case you need to create 2 separate tunnels:

- 1. On «host A»: local forwarding tunnel from port «X» to «host C» port «Z».
- 2. On «host B»: remote forwarding tunnel from «host C» port «Z» to local port «Y».

Your tunnel's host chain length is not limited if you need to pass through a few gateways:

Architecture

qmTunnel consists of 2 modules:

- **qmTunnel-server** server module which needs to be started on all tunnel hosts (at least two). It's possible to run qmtunnel-server as GUI application or as background console application (use -daemon command line parameter).
- **qmTunnel-gui** GUI which connects to qmtunnel-server instances (including remote ones) and allows to configure them and create/edit/monitor tunnels.

qmTunnel is a free open source cross-platform application and runs on Linux, Windows and possibly (haven't tested yet) MacOS.

To build and run qmTunnel, you only need Qt4/Qt5 and OpenSSL libraries.

License

qmtunnel is released under GNU General Public License 3.0, with the additional special exception to link portions of this program with the OpenSSL library. See LICENSE file for more details.



Fig. 1.2: Providing tunnel to other hosts on the same network



Fig. 1.3: Remote (reverse) tunnel



Fig. 1.4: Using extra qmTunnel server as communication server



Fig. 1.5: Tunnel through several gateways

Support

qmtunnel is open-source project, which means it's considered to be supported by the community.

However if you wish to use it in production environment, commercial support is also available from the author and maintainer of this project. Contact support@qmtunnel.com for details. This way you can also support the project.

Copyrights

Copyright (c) 2017 Nikolay N. Karikh (knn@qmtunnel.com)

LEGAL NOTICE: This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/)

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Copyright (c) 1995-1998 Eric A. Young (eay@cryptsoft.com), Tim J. Hudson (tjh@cryptsoft.com)

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CHAPTER 2

Getting started

You may find qmTunnel useful if you need (all features are optional):

- to secure your connection with SSL/TLS;
- to connect to hosts/networks behind NAT/firewall;
- to compress your traffic;
- to detect silent packet drops and disconnections (by enabling heartbeats);
- to allow short-time disconnections between tunnel hosts with no application disconnections;
- to add additional authentication level to tunnel hosts;
- to automatically re-establish the tunnel on disconnections (permanent tunnel);
- to establish tunnel only when needed (on demand).

Installation

You can either download binaries or build the project from sources.

Binaries download link: http://qmtunnel.com/download/

At the moment the binaries are provided without any installation tools or scripts and for Windows (compiled in 32-bit) only. You just need to unpack the files and put them into some directory.

You can also see section Building from source for build instructions on Linux platforms.

Setting up qmTunnel server instance

When you first run qmtunnel-server process in GUI mode, it will ask you to set up your qmTunnel server instance certificate:

🛚 🖨 🔲 qmtunnel Server v0.1										
Manager Connection Users & Group	05									
Tunnel Server management connecti	Tunnel Server management connection parameters:									
Listen address: 0.0.0.0 (Any IPv4)										
Server SSL credentials:	Server SSL credentials:									
Private key file: RSA key	in PEM format, no passphrase	Browse								
X.509 SSL certificate file: in PEM for	ormat	Browse								
	First start	tificate pair								
Maximum incoming connection	Configuration file /home/knn/qmtunnel/bin/qmtunnel- server.conf not found. If this is the first start and you don't have any private key and SSL certificate ready for qmtunnel server, begin with "Generate new private key & certificate pair" button. Then press "Apply & Save" button to create and save configuration file.									
Apply & Save	Stop server Car	ncel & Restore								

 $Click\; \mbox{OK} \mbox{ and then} \mbox{ Generate new private key & certificate pair} \ldots$

😕 🗊 Gentificate and private key generator							
Certificate info							
Please fill in the following info to generate new SSL private key and certificate pair:							
Username (CN): hppav							
Organization:							
E-Mail:							
Key length: 2048 bits ‡							
Cancel < <u>B</u> ack <u>N</u> ext >							

Edit Username (CN) and Key length if neccessary and press Next $\,>.\,$



Randomly move your mouse cursor over empty space inside the wizard window to generate better random seed. Then press Next >.

😣 🗉 Certificate and private key generator								
Save certificate and private key								
Please enter or select file names to save generated cer private key:	tificate and							
Certificate filename: /home/user/qmtunnel/hppav.crt	Browse							
You will need to provide your certificate to the servers connect to.	you want to							
Private key filename: home/user/qmtunnel/hppav.key	Browse							
Keep your private key in secure place and do not allow it.	others to get							
Cancel < <u>B</u> ack	<u> </u>							

Edit file paths and press Finish.

Note: Please ensure that you keep your private key in a safe place and do not give access to it to anyone except this qmTunnel server instance.

Your server private key and certificate is ready! Press Apply & Save button in the bottom.

😣 🖻 🗊 qīmetunnel Server	v0.1							
Manager Connection User	s & Groups							
Tunnel Server management connection parameters:								
Listen address: 0.0.0.0 (An	y IPv4)	Port: 9200 ¹						
Server SSL credentials:								
Private key file:	hppav.key	Browse						
X.509 SSL certificate file:	hppav.crt	Browse						
	Generate new private key	& certificate pair						
Maximum incoming connect	tions: 100							
Apply & Save	Stop server	Cancel & Restore						

You can also change the TCP Port on which qmTunnel operates (if neccessary) and choose specific Listen address if you don't want qmTunnel to accept connections from all available networks.

OK, now our first qmTunnel server is up & running.

Repeat the above setup steps on at least one other host to have at least two qmTunnel servers running. Let's suppose that the first qmTunnel server would be at the client side, and the second one would be on destination server or network.

Setting up qmTunnel GUI

In order to create, modify and monitor tunnels and manage qmTunnel servers you need to run separate application called qmTunnel-gui.

When you first run qmtunnel-gui, it will also ask you to set up your personal private key and certificate which will be used to connect to and manage qmTunnel servers:



Click OK and User Settings dialog would pop up, where you can then press Generate new private key & certificate pair... button and then repeat the same steps as for server certificate.

If you missed User Settings dialog, you can call it from main window menu Profile -> UI Settings... and then go to SSL Certificate&Key tab.

(🔋 🗉 User Settings						
	General SSL Certificate&Key						
	You can modify/generate your personal default SSL private key and certificate below:						
	Private key file: RSA key in PEM format, no Browse						
SSL certificate file: in PEM format Browse							
	Generate new private key & certificate pair						
	<u>C</u> ancel <u>O</u> K	5					

This private key and certificate will be used by default to connect to qmTunnel servers.

Connecting to qmTunnel server from GUI

qmTunnel server requires user or other server's certificate to authorize incoming connection.

Once you have created your personal certificate in <code>qmtunnel-gui</code> (see above), you can copy&paste the contents of this certificate in <code>qmTunnel-server</code>:

😣 🖨 🗊 qīm tunnel S	erver v0.1					
Manager Connection	Users & Groups					
 Administrators 						
admin						
Tunnel servers						
		111				
User name: admin			🥑 enabled			
X.509 SSL certificate in	PEM format:					
BEGIN CERTIFICATE MIICoTCCAYmgAwIBAgIBKjANBgkqhkiG9w0BAQQFADAUMRIwEAYDVQQDEwl YWRtaW4wHhcNMTcwMzA1MTQzNzA5WhcNMjIwNTE1MTQzNzA5WjAUMRIwI Ewlrbm4tYWRtaW4wggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAwggEKAoIBAQI AnssIElVOAWQxUPc4xsMSLuXBgYKn3HXuJeSk6TFuzNzp1fRRBrEq7hkXagEbw WK5vU/i78GLLGbHd6ZxNg0h2VhL3JOCpUR/+UZLUaTFg3DID5d+e4SitXKCK/6L						
((
			Load from local file			
or password: (not rec	ommended) click	to change	Unset			
Apply & Save	Stop s	erver	Cancel & Restore			

In qmtunnel-server user interface there is tab called Users & Groups which allows to manage access to this qmTunnel server instance.

By default, there is an Administrators group with full access and one admin user without certificate. Just select this admin user in the list and paste your personal certificate contents into corresponding field.

Do not forget to press Apply & Save button after any modification.

OK, now return to qmtunnel-gui application.

At the left part of the main window there is a list of qmTunnel servers available. At the moment it's empty, so right-click on this list and select Add tunnel server... from the context menu:

😣 🗐 🗊 qīmtilinnēl GUI v0.1								
Name 💌 Status & Latency	Manager connection	Server management	Users & Groups					
📕 🖳 Tunnel Server 1 🔘	The information below i	is only used by CUI to con	pact to amtupped bost	management interface				
	Management connect	tion name (user-define	d).	management interrace.				
			u).					
	tocat quittunnet serve							
	Management connect	tion parameters:						
	Host: localhost	Port	:: 9200 📮					
	Automatic perma	Automatic permanent connection (always try to keep connection alive)						
	O Connect on dema	nd (disconnect when ic	dle)					
	Set private key and	certificate if you don't	want to use server cr	redentials:				
	Private key file	: ssl/knn-admin.key		Browse				
	X 509 certificate file	500 certificate file: cs/kpp.admin.cst						
	Authentication:							
	👿 by X.509 certific	ate (set above)						
	by username and	d password						
	Username:							
	Password:	if you want to save it						
			S	show additional options >>				
	Apply & Save profil	e Apply		Cancel				

There is not much info required to enter here. Just enter something in the Management connection name, enter qmTunnel server IP-address or domain name (localhost if on the same host) in Host field, and port (if changed in qmtunnel-server).

There are many additional settings which are available by clicking Show additional options button, but in most cases you'll be fine with defaults.

OK, now press Apply & Save profile button and choose a file to store your profile (qmTunnel servers list) in.

😣 🖱 💿 ၾကင်းပါးရာ၏ GUI v0.1 - /home/knn/qmtunnel/bin/testprofile.qmt										
Name 👻	Status & Latency	Manager connection	Server management	Users & Groups						
ppav qmtunnel server 🖳	r 🤘 1 ms	The information below interface.	The information below is only used by GUI to connect to qmtunnel host management interface.							
		Management connec	tion name (user-define	d):						
		hppav qmtunnel serv	hppav qmtunnel server 🧭 enabled							
		Management connec	Management connection parameters:							
		Host: localhost	Host: localhost Port: 9200 🗘							
		Automatic perma	nent connection (alwa	vs try to keep con	nection alive)					
		 Connect on dema 	and (disconnect when i	dle)	,					
		Cot orivoto kou and	·		s stadootials:					
		Set private key and	certificate ir you don't	want to use serve	r credentials:					
		Private key file	e: ssl/knn-admin.key		Browse					
		X.509 certificate file	e: ssl/knn-admin.crt		Browse					
		Authentication:								
		👿 by X.509 certific	ate (set above)							
		by username and	d password							
		Username:								
		Password:	if you want to save it							
		Show additional options >>								
		Apply & Save profil	le Apply		Cancel					
((· · · · · · · · · · · · · · · · · ·										

Now the green indicator shows that you have successfully connected to your first qmTunnel server.

You can now use <code>qmtunnel-gui</code> to configure this <code>qmTunnel</code> server. Use <code>Server</code> management and <code>Users & Groups</code> tabs for this purpose.

Creating tunnels from GUI

In order to create a tunnel, you first need to ensure that any of your qmTunnel servers "know" previous qmTunnel server in chain.

In the current example, we need to authorize our first qmTunnel server on the second qmTunnel server.

There is a pre-created user group called Tunnel servers which we can add our first server to:

a qmtunnel Server v0.1	
<u>Eile 2</u>	
Manager Connection Users & Groups	
Administrators	
Tunnel servers	
hppav-qmtunnel-server1	
	7
User name: hppav-qmtunnel-server1	🖌 enabled
X.509 SSL certificate in PEM format:	
BEGIN CERTIFICATE MUCMTCC 0 VG 20 WIR 0 a IBK 10 NB a kabki G9 W0B 0 OOE 0 D 0 OM 04 WD 0 VD VOODE wWo cHBb	
djAeFw0xNzA2MTMwOTQ1MTVaFw0yMjA4MjMwOTQ1MTVaMBAxDjAMBgNVBAMTBWhw	
+jthpFPpDiW+Cz5UaF6AGF4Oof7bxXg4LMQVkI3cU9R5+XZMJKF5waq28l++sE6	
SvB5uAf8myTxwMolhWUeT1Y8+OWJEazE06r2KgsqS81L9O5APsweMOo+X4dfFZEu 5V9ukgFgsVH2NWskBIK5CNByw4aEPL3K04LGzBciZ1cX3HM1Hicu3bgYIByVxGtF	=
K1UCpdiBDUbgqNMZu5WpmJaWkQVKr6PiFEjAgBAsU/jlgX5ssK6PGWZfmWNA8m/e	
ToiIvQIDAQABMA0GC5qGSIb3DQEBBAUAA4IBAQCdWDNEi7+nV9I+Ge6XzG7XjsDs	
eqZGtn8cQDNonbHHo7W9UOUUp5beLsIMQPR2qfmyh4jyR5CY68v/1Wuzg4+hf0f9 t0GQOth8VSR5biwgJUOPQ080vYe7feX+cP6TTd0fX7gddRInzGM57wxHsMo9R3PP	
asoNZEqa5FuLg8Tq/vgk4fk22u12BQBn0g37cj39BFo6bK/yqAz4i5xrnpKw7oZH ZE0ioY6MXXB4/iCPI0Lt6XPazMko4kw7zzzTHNmTErOeNCzxhTHfeOL5aOG9OL+w	~
Load	irom local file
or password: (not recommended) click to change	Unset
(ipply & Save) Stop cerver	ocel & Pectore

Do this on the second qmTunnel server.

To add user to the group, right-click on the group and select Add user.... Specify any user name your want, just make sure to paste correct server certificate.

Press Apply & Save. Now the first qmTunnel server can connect to the second one.

Now let's create a simple local-forwarding tunnel.

Let's suppose that the second server is located in a remote network with a PostgreSQL server we need to access like this:



Return to qmtunnel-gui, right-click on our connected qmtunnel server and choose Create new tunnel...:

😣 🖨 🗊 🏼 🍘 📾 🥵 🕲 🔞 🕲 🔿 🕲							
Name Status & Later	Statistics summary C	onnection list	Configuration				
▼ 🖳 hppav qmtunnel server <table-cell> 0 ms ■ 🍋 New tunnel 🍥 N/A</table-cell>	Tunnel name: Tunnel direction: Application protocol: Bind address: Remote host: Semote host:	Tunnel to Post Local-To-Remo TCP : 0.0.0.0 psqlserver	gres te (see schema)	a below) max.com Connect Idle	nections: 100 port: 9 port: 5 timeout: 10, timeout: 300	0 ¢ 9999 ¢ 6432 ¢ 0 s ¢	
Ξ	Failure tolerance timeout: 1,0 s						
	Remote tunnel server: Tunnel server hostnames ar in chain. The first remote tu	s chain (one or r re relative to curren nnel server hostnar	nore): t one in chain. E.g. " me is relative to the	localhost" is local tunne	s the current tunr l server.	nel server	
	Tunnel server host Port						
	wingw			9200 📮	Settings	X	
				9200 🗘	Settings	×	
(4 (Create tunnel				Ca	ancel	

Fill up the following fields:

- Tunnel name specify any tunnel name you want.
- **Bind address** set to 0.0.0.0 if you want to share the tunnel with other hosts in your network, or 127.0. 0.1 to make the tunnel available only from the current qmTunnel server host ("hppav").
- **port** (bind port) set to any port available. 9999 was chosen for demonstration purposes. You can enter the same port as destination (5432) if it's available on qmTunnel host. This is the port your service/application client would connect to on the first qmTunnel server host.
- **Remote host** set to IP address or domain name of destination service/application host. This is relative to the final qmTunnel server in chain and must be known on it. In the example above host "psqlserver" should be known on and available from "wingw" host. If you need to connect to the service/application located directly on the final qmTunnel host, you should enter localhost or 127.0.0.1 here.
- **port** (remote port) set to final destination service/application port on remote host. This is where you actually want to connect to.
- Always keep tunnel open Set this flag if you want this tunnel to be permanent and auto-reconnect when needed.
- **Remote tunnel servers chain** add all qmTunnel servers in chain here except the first one. Be careful with domain/hostnames they are also relative (should be known on and available from) each from previous one.

Then press the Create tunnel button.

If everything is correct, you will see green indicator for your newly created tunnel:

😣 🖨 🗊 qīmtüinnel GUI v0.1 - /home/knn/qr	ntunnel/bin/testprofi	le.qmt					
Name Status & Latency	Statistics summary C	onnection list	Configuration				
 End of the server of the server	Tunnel name:	Tunnel to Post	gres	a below)			
	Application protocol:	Application protocol: TCP 🛟				100	•
	Bind address:	0.0.0.0			por	t: 9999	-
	Remote host:	psqlserver			рог	t: 5432	•
				Conne	ct timeout:	10,0 s	•
	🧭 Always keep tunn	el open (permar	ent tunnel)	Id	le timeout:	300,0 s	*
	Failure tolerance time	out: 1,0 s	*				
Ξ	Bind address:por	t	Remote tunnel serv (last one in chain)	Remote P	iost:port		
	Remote tunnel server Tunnel server hostnames a first remote tunnel server h	s chain (one or r re relative to curren nostname is relative	nore): t one in chain. E.g. " to the local tunnel s	localhost" is the curre server.	ent tunnel serve	r in chain. ⁻	The
	Tunnel server host Port						
	wingw			9200	\$ Settings	s 🗡	
				9200	🗘 Settings	X	<
((())))))))))) () () ()	Rebuild tunnel					Cancel	

Now you can check the postgres connection to "hppav" which is transparently tunneled to "psqlserver":

psql –h hppav –p 9999 –U postgres postgres

You can now also monitor tunnel activity:

😣 🖻 🗉 🛛 qmtunnel GUI v0.1 - /home/knn/qmtu	ınnel/bin/testprofi	le.qmt					
Name Status & Latency	Statistics summary	Connecti	on list Configuration				
hppav qmtunnel server of 0 ms Tunnel to Postares OK (1 ms)							
		2,03	v				
	Active conn	ections	1				
	Total conne	ctions	б				
	- Failed conne	ections	0 661 b				
	- Sent to clier	nts	856 b				
	 Total summary 	td	4 6 14				
	- Total bytes	received sent	1.6 KD 1.8 Kb				
	- Total encryp	oted bytes s	ent 5.6 Kb				
	- Tunnel chair	n errors det	ected 0				
	Last turned arrest	o coluo du					
	Last tunnet error n	eceived:					
😣 🗐 💷 qmtunnel GUI v0.1 - /home/knn/qmtu	ınnel/bin/testprofi	le.qmt					
Image: Status & Latency	unnel/bin/testprofi Statistics summary	le.qmt Connecti	on list Configuration			-	
on qmtunnel GUI v0.1 - /home/knn/qmtu Name Status & Latency Ehppav qmtunnel server Of 0 ms	unnel/bin/testprofi Statistics summary	le.qmt Connecti	on list Configuration				
Image: status and status	unnel/bin/testprofi Statistics summary Ø auto-update ev	Connectivery 2,0 s	on list Configuration		St	now disc	onnected clients
⊗ ● ● qmtunnel GUI v0.1 - /home/knn/qmtu Name ▼ Status & Latency ▼ ■ hppav qmtunnel server ● 0 ms ■ ↓ Tunnel to Postgres ● OK (1 ms)	Innel/bin/testprofi Statistics summary auto-update ev Peer address:port	le.qmt Connectivery 2,0 s Out.port	on list Configuration	Disconnected	Sh Rx	now disc Tx	onnected clients Status
Image: Status & Latency Name Status & Latency Image: Status & Latency	Innel/bin/testprofi Statistics summary auto-update ev Peer address:port 127.0.0.1:45017	Connection Connection Very 2,0 s Out.port 1084	on list Configuration	Disconnected	Sh Rx 103 b	Tx 282 b	onnected clients Status Connected
 Image: approximate and the second secon	Statistics summary auto-update ev Peer address:port 127.0.0.1:45017 127.0.0.1:45016	Le.qmt Connectivery 2,0 s Out.port 1084	Configuration Connected 2017-06-15 15:11:13 2017-06-15 15:11:13	Disconnected	Sh Rx 103 b 133 b	Tx 282 b 132 b	onnected clients Status Connected The remote
⊗ ● ● qmtunnel GUI v0.1 - /home/knn/qmtu Name ▼ Status & Latency ▼ ■ hppav qmtunnel server ● 0 ms ● Tunnel to Postgres ● OK (1 ms)	Statistics summary value -update ev Peer address:port 127.0.0.1:45016 127.0.0.1:45015	Le.qmt Connectivery 2,0 s Out.port 1084 1083 1082	Configuration Connected 2017-06-15 15:11:13 2017-06-15 15:11:13	Disconnected 2017-06-1 2017-06-1	Sh Rx 103 b 133 b 92 b	row disco Tx 282 b 132 b 14 b	onnected clients Status Connected The remote The remote
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 	Peer address:port 127.0.0.1:45017 127.0.0.1:45016 127.0.0.1:45015 127.0.0.1:45001 127.0.0.1:45001	Le.qmt Connection Very 2,0 s Out.port 1084 1083 1082 1081 1080	Configuration Connected 2017-06-15 15:11:13 2017-06-15 15:11:13 2017-06-15 15:11:11 2017-06-15 15:09:25	Disconnected 2017-06-1 2017-06-1 2017-06-1 2017-06-1	Sh Rx 103 b 133 b 92 b 108 b 133 b	Tx 282 b 132 b 14 b 282 b 132 b	onnected clients Status Connected The remote The remote The remote The remote
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CHAPTER $\mathbf{3}$

Tunnel setup

Tunnel settings

When creating a tunnel, you can set up the following tunnel parameters:

😣 🖨 🗉 ຊັກາະມິເສາ el GUI v0.1 - /home/k	nn/qmtunnel/bin/testp	orofile.qmt						
Name Status & Later	Statistics summary Connection list Configuration							
▼ 🖳 hppav qmtunnel server <table-cell> 0 ms ■ 🎝 New tunnel 🍥 N/A</table-cell>	Tunnel name: Tunnel direction: Application protocol: Bind address: Remote host: Semote host:	Tunnel to Post Local-To-Remo TCP : 0.0.0.0 psqlserver	gres te (see schema)	a below) max.com Connect Idle	nections: 10 port: 9 port: 5 timeout: 10, timeout: 30	0 \$ 9999 \$ 6432 \$ 0,0 \$ 0,0 \$		
3	Failure tolerance time Bind address:por	t	Remote tunnel serv (last one in chain)	er,	Remote host:pool	rt		
Remote tunnel servers chain (one or more): Tunnel server hostnames are relative to current one in chain. E.g. "localhost" is the current tunnel server in chain. The first remote tunnel server hostname is relative to the local tunnel server.								
	Tunn	Port						
	wingw			9200 🗘	Settings	X		
				9200 🗘	Settings	×		
(+()))))	Create tunnel				Ca	ancel		

- Tunnel name specify any tunnel name you want.
- Tunnel direction specify where to accept incoming connections from tunnel clients:
 - Local-To-Remote accept incoming connections on the first tunnel server and forward traffic to the remote host of the last tunnel server in chain.
 - Remote-To-Local accept incoming connections on the last tunnel server in chain and forward traffic to the remote host of the first tunnel server in chain.
- Application protocol specify which protocol is used by the application client which traffic is to be forwarded.
- max.connections maximum number of incoming application client connections which can be accepted.
- **Bind address** set to 0.0.0.0 if you want to share the tunnel with other hosts in your network, or 127.0. 0.1 to make the tunnel available only from the first (or the last in case of Remote-To-Local tunnel direction) qmTunnel server host.
- **port** (bind port) set to any port available. You can enter the same port as remote destination if it's available on listening qmTunnel host. This is the port your service/application client would connect to on the first (or the last in case of Remote-To-Local tunnel direction) qmTunnel server host.
- **Remote host** set to IP address or domain name of destination service/application host. This is relative to the last (or the first in case of Remote-To-Local tunnel direction) qmTunnel server in chain and must be known on it. If you need to connect to the service/application located directly on the qmTunnel host, you should enter localhost or 127.0.0.1 here.

- **port** (remote port) set to final destination service/application port on remote host. This is where you actually want to connect to.
- **Connection timeout** application client connect timeout, used by qmTunnel server to establish outgoing connection to the application server.
- Always keep tunnel open set this flag if you want this tunnel to be permanent and auto-reconnect when needed.
- **Idle timeout** if there isn't any active application client connection for this time interval, consider the tunnel idle and disconnect. If new incoming application client connects after that, automatically re-establish the tunnel ("on demand" mode).
- Failure tolerance timeout if any of the tunnel servers in chain disconnects, do not disconnect application clients during the timeout specified and try to silently re-establish the tunnel.
- **Remote tunnel servers chain** add all qmTunnel servers in chain here except the first one. Be careful with domain/hostnames they are also relative (should be known on and available from) each from previous one.

Tunnel servers connection settings

When creating a tunnel, you enter remote tunnel servers list (chain).

For every server in chain you can specify additional connection settings by pressing corresponding Settings... button in the same line.

The following window will then pop up:

Sunnel server connection settings				
Management connection parameters:				
Host: wingw Port: 9200				
Authentication:				
👿 by X.509 certificate (use tunnel server certificate)				
by username and password				
Username:				
Password: lif you want to save it				
Connection timeout: 10,0 s				
Reconnect interval: 0,10 s 📮 multiplicator: x1,5 📮 maximum: 10,00 s 📮				
Receive timeout: 15,0 s (0 = no receive timeout)				
Senable heartbeats max interval: 10,0 s 🖕 (allows to check latency)				
S Enable compression				
X.509 Server certificate file: in PEM format Browse Disable encryption				
Enable TCP Keep Alive				
Low delay option (disable Nagle's algorihm)				
Max. I/O buffer size: 32,0 Mb (0 = unlimited)				
Encryption protocol: Auto				
Allowed ciphers:				
(optional) colon-separated list of cipher suite names. The ciphers are listed				
You can choose available ciphers using autocompleter.				
OK Cancel				

- Connection timeout Connection timeout when connecting to this tunnel server.
- Reconnect interval When connection fails, try to reconnect after specified time interval.

multiplicator - Multiply current reconnect interval after each failed connection attempt.

maximum - Maximum value of current reconnect interval.

- **Receive timeout** Consider connection failed if no data received in this interval. In pair with enabled heartbeats this allows to detect TCP silent connection drops.
- Enable heartbeats Send small heartbeat packets if nothing else has been sent in max interval time interval.
- Enable compression Enable traffic compression. Only application-level data is to be compressed (and only if

compressed data packet becomes smaller than uncompressed).

- **X.509 Server certificate file** You can enter the path to qmTunnel server certificate file here and it will be checked after handshake. This allows to add additional security against MiTM attacks. Please note that at the moment this file path should be located on the first qmTunnel server host, so you have to edit it manually [will be fixed].
- Encryption protocol Desired encryption protocol to use. Depending on Qt and OpenSSL version used, this may include: TLSv1.2, TLSv.1.1, TLSv.1.0, SSLv3, SSLv2. "Auto" means select most secure available protocol.

CHAPTER 4

Troubleshooting

If you're going to submit an issue or write to techinal support, please consider gathering the maximum of information. See below how to do that.

Debug logs

When started with -debug command line argument, both qmtunnel-server and qmtunnel-gui would write detailed log into logfile.

By default, logfile is qmtunnel-server.log and qmtunnel-gui.log correspondingly. You can change log filename with -logfile FILENAME command line option. For example:

./qmtunnel-server -debug -logfile serverlog.txt

You can also limit log verbosity if you specify debug level (0 to 9):

./qmtunnel-server -debug 8

Draw your schema

If you realize something is going wrong way or you have hard times understanding the principles of forwarding and tunneling, start with drawing your network objects and connections you'd like to establish:



It's not perfect, but it might help you to better understand what you are doing.

Include you configuration

qmtunnel-server writes the configuration of the server to qmtunnel-server.conf file. You can change that
with -config command line argument like this:

./qmtunnel-server -config <code>serverconfig.json</code>

The config file is written in JSON format and you can easily edit it manually if needed. You can also prepare such config file and copy it to another server if you wish.

Note: Config file doesn't contain any confedential information such as private keys.

Private keys should be stored in separate files in a safe place.

Ensure you include your config files along with debug logfiles and schema when submitting an issue.

CHAPTER 5

Building from source

To build qmtunnel, you need Qt >= 4.8 and OpenSSL <= 1.0.2 installed.

Note: If you wish, you can build them from source too:

- Qt: https://www.qt.io/download-open-source/
- OpenSSL: https://www.openssl.org/source/

RedHat/CentOS (7)

1. Install C++ development tools, Qt and OpenSSL:

```
sudo yum group install "Development Tools"
sudo yum install qt5-qtbase-devel openssl-devel
```

2. Download sources:

```
git clone https://github.com/karikhn/qmtunnel.git
```

3. Build:

```
cd qmtunnel/src/server
qmake-qt5
make
cd ../gui
qmake-qt5
make
```

4. Binaries will be created in qmtunnel/bin directory.

Ubuntu (14.04 LTS)

1. Install C++ development tools, Qt and OpenSSL:

```
sudo apt-get install build-essential git qtbase5-dev libssl-dev
```

2. Download sources:

git clone https://github.com/karikhn/qmtunnel.git

3. Build:

```
cd qmtunnel/src/server
qmake -qt=5
make
cd ../gui
qmake -qt=5
make
```

4. Binaries will be created in qmtunnel/bin directory.

Windows XP and later (32 bit)

1. Install Qt 5.6 with MinGW:

http://download.qt.io/official_releases/qt/5.6/5.6.2/qt-opensource-windows-x86-mingw492-5.6.2.exe

2. Install OpenSSL 1.0.2:

http://slproweb.com/download/Win32OpenSSL-1_0_2L.exe

- 3. Update PATH environment variable to include:
 - C:\Qt\Qt5.6.2\5.6\mingw49_32\bin
 - C:\Qt\Qt5.6.2\Tools\mingw492_32\bin
- 4. Get the latest qmtunnel sources from GitHub:

https://github.com/karikhn/qmtunnel/archive/master.zip

5. Unpack, cd to qmtunnel directory and run:

```
cd src\gui
qmake
mingw32-make
cd ..\server
qmake
mingw32-make
```

- 6. Copy the following files to bin directory where qmtunnel-*.exe is located:
 - C:\OpenSSL-Win32\bin\libeay32.dll
 - C:\OpenSSL-Win32\bin\ssleay32.dll
 - C:\OpenSSL-Win32\bin\msvcr120.dll
 - C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\Qt5Core.dll
 - C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\Qt5Gui.dll

- C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\Qt5Network.dll
- C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\Qt5Widgets.dll
- C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\libgcc_s_dw2-1.dll
- C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\libstdc++-6.dll
- C:\Qt\Qt5.6.2\5.6\mingw49_32\bin\libwinpthread-1.dll
- Directory C:\Qt\Qt5.6.2\5.6\mingw49_32\plugins\platforms (actually only need platforms\qwindows.dll)

NEED HELP?

E-mail: support@qmtunnel.com

Note: Please be aware that individual-case direct technical support is delivered on a commercial basis.

CHAPTER 6

Indices and tables

- genindex
- modindex
- search