



Adding support for SR-IOV, Intel QAT, and enhancing SNMP.



#### Agenda

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#### SR-IOV & QAT

#### 2 100GbE NIC

#### 3 SNMP

#### Remotely manage multiple NAS on networks

• Ecosystem & Zabbix 5

QuTS

Live demo

#### Enhanced Management

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### The network problem of enterprise



# How to reduce the network bandwidth loss of VM?



# SR-IOV- Single Root I/O Virtualization

A physical network card (Physical Function, PF) can virtualize multiple lightweight PCI-e physical devices (Virtual Function, VF), which can be allocated to virtual machines.

In fact, the VMs uses the VF on the physical network card directly and enjoy the network speed from the network card.





### **SR-IOV** Architecture

#### Normal

**SR-IOV** 





# The network speed used by SR-IOV is enhanced 20%

	VM NAS (Client) to NAS(server) None SR-IOV	VM (VF)NAS (Client) to NAS(server) - <b>SR-IOV</b>	
NAS CPU Usage	97%	95%	Reduce CPU usage
VM OS CPU Usage	13%	12%	Reduce CPU usage
Transfer speed	1GB/s	1.21 GB/s	Enhance performance 20%

#### VM /NAS Client to Server data transfer test



Test environment setting	VM
TS-h868 (Client) / FW 4.5.1.1427 + NIC QXG- 10G2SF-CX4	OS : windows server 2016
TS-h668 (Server) / FW 4.51.1427 +NIC QXG- 10G2SF-CX4	Cores : 8 (NAS cores )
QVS 3.5.1 20200914	Memory: 3GB

Build 8 VM ,8 VF in QXG-10G2SF-CX48 allocate 1 VF to 1 VM use

# QAT technology doubles compression performance

	ubuntu- amd64.iso	18.04.1-desktop- (1.81GB)-None QAT	ubuntu-18.04.1 amd64.iso (1.81		
Compression Time		122.64s	62.28s		Double Compression Speed!
NAS CPU useage		95%	93%	CPU useage almost the	
8 VM,each VM	1 allocate	e 1 QAT VF			13 01014
compression t	test at th	e same time.	VM5	VM6 VM	17 VM8
Test environment setting	VM				
Test model: TS-b886	VM OS: ubuntu 18.04				

Test model: TS-h886 VM OS: ubuntu 18.04 QVS 3.5.3 Cores : 8 (同NAS cores 數) Memory : 1GB

### The visual UI is easier to use



#### SR-IOV advantages and benefits for user



#### Advantage

• Let the services on your virtual machine enjoy the physical network speed.

#### **Benefits**

- If you need real-time service needs, such as ticket booking service, cash flow service, audio-visual service, you can directly enjoy the speed of the hardware network card, reducing network delay.
- Reduce the usage of the host's CPU.
- Increase network efficiency by at least 20%.

# **SR-IOV**



# **SR-IOV Support list**

#### SR-IOV support model list and BIOS Version:

- TS-h686(Q05SAR01)/TS-h886(Q05SAR01)
- TS-1886XU-RP(Q047AR03)/TS-h1886XU-RP(Q047AR03)
- TDS-16489U(QX31AR19)/TDS-16489U-R2(QX31AR19)
- QGD-1602P(Q03OAR05)
- TS-h2490FU(Q03XAR15)

#### QAT support model :

• QGD-1602P

#### NIC Card :

- Intel : LAN-10G2T-X550
- Mellanox :LAN-10G2SF-MLX/LAN-40G2SF-MLX
- Mellanox :QXG-10G2SF-CX4/QXG-25G2SF-CX4

### **SR-IOV** notice

Windows 10	11% 25%	HDD 1:	Adapter 1: 192.168.180.74
	6 cores 8 GB	/Public/Win10.Auto.1903/Win10.Auto.1903_00.img (25.7GB)	fe80::b1b0:6578:8f4f:a02d%12
0 II   2 Ø 🕾 O D G 🧉	You cannot migrate a "SR-IOV" e	nabled VM.	

- SR-IOV needs to be matched with a supported model, BIOS version and supported network card to support it.
- SR-IOV support SW version QTS 4.5.2 & QVS 3.5.3 .
- QAT needs to install the corresponding virtual function driver in the Guest OS

\*Currently, the downloadable driver version on the official website is Linux and FreeBSD Intel driver download link -https://01.org/intel-quick-assist-technology/downloads

• The VM Live Migration function cannot be used when using SR-IOV (Device Passthrough)

Because the physical device used by the VM will not recognize the original physical device ID after VM Live migration.





### Dual-port 100GbE Network Interface Card QXG-100G2SF-E810

The dual-port QXG-100G2SF-E810 100GbE network interface card with Intel® Ethernet Controller E810 supports PCIe 4.0 and provides up to 100Gbps bandwidth to overcome performance bottlenecks.

\*Port config mode for 2 x 50GbE / 4 x 25GbE / 8 x 10GbE coming soon!



QXG-100G2SF-E810

#### QXG-100G2SF-E810 will support iWARP / RDMA, SR-IOV and Link Aggregation soon!



Support iWARP/RDMA, realize RDMA through IP network, can realize low-latency, high-throughput direct memory-tomemory network communication, thereby eliminating unnecessary data movement.



SR-IOV network I/O virtualization, which directly allocates the bandwidth resources of the physical network card to the virtual machine, can reduce network bandwidth loss and increase network efficiency by more than 20%, and is more stable, which also helps reduce Hypervisor CPU is consumed. Note: Only certain NAS models support SR-IOV technology



Used with a high-speed 25/50/100 network switch, it can be configured with Failover fault-tolerant switching. When the network fails, two groups of 100GbE paths can reach a redundant/backup network through the switch to ensure uninterrupted service.





## **SNMP** in a Nutshell

- Simple Network Management Protocol (SNMP) is an Internet Standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behavior.
- SNMP consists of three key components: managed devices, agents, and network-management systems (NMSs).
- The protocol is a set of standards for communication with devices in a **TCP/IP network**.
- Monitoring and management of devices such as routers, access servers, switches, cable modems, bridges, hubs, IP telephones, IP video cameras, computer hosts, and printers.



# **Basic networking Topology**

- Two and multi-tier topology
  - Firewall
  - Switch
- Security handled by Firewall
- Devices and endpoints are connected with switches
- Public Devices/NAS
- Internal Devices/NAS accessible only in same or transperent subnet



# Common problems with remote device monitoring without NMS

- No Realtime Data: Without NMS and protocols such as SNMP its hard-to-get real time status of the device and various parameters
- Cannot have more advance widgets to view, monitor and compare statistics of various devices at the same time.
- IT may have to login to each device manually to monitor and manage it. Which is not at all ideal for IT.
- Event notification configuration need to be done on each device separately, manually.
- Very little and cumbersome report generation capabilities.



## **Network Management with SNMP**



# New SNMP MIB with QTS 4.5.2

#### Whats New?

- New restructured, well-organized, more elaborate MIB
- Contains various new nodes such as storage, system, external, applications, services.
- Support added for monitoring installed applications and related metadata.
- · Support added for fiber channel adapter and related information monitoring.
- Many new SNMP sensors added.
- · Fixed issue with UPS SNMP community string.
- QTS SNMP implementation blocks write operations for security purpose.
   We do support read only operations hence providing ideal environment for Device monitoring
- Supports old MIB also, for the backward compatibility.

### New OID and MIB Structure for QTS 4.5.2

Old OID and Alias •OID: .1.3.6.1.4.1.24681 •OID Alias: .iso.org.dod.internet.private.enterprises.storage

#### **NEW OID and Alias**

•OID: .1.3.6.1.4.1.55062.1

•OID Alias: .iso.org.dod.internet.private.enterprise.qnap.qts

OID	OID Alias
.1.3.6.1.4.1.55062.1	.iso.org.dod.internet.private.enterprises.qnap.qts
.1.3.6.1.4.1.55062.1.10	.iso.org.dod.internet.private.enterprises.qnap.qts.storage
.1.3.6.1.4.1.55062.1.12	.iso.org.dod.internet.private.enterprises.qnap.qts.system
.1.3.6.1.4.1.55062.1.13	.iso.org.dod.internet.private.enterprises.qnap.qts.external
.1.3.6.1.4.1.55062.1.14	.iso.org.dod.internet.private.enterprises.qnap.qts.services
.1.3.6.1.4.1.55062.1.15	.iso.org.dod.internet.private.enterprises.qnap.qts.applications

Note: Details of each category will be discussed in the demo session for easier understanding

#### **New MIB structure across QNAP Devices**

OID Alias
.iso.org.dod.internet.private.enterprises.qnap
.iso.org.dod.internet.private.enterprises.qnap.qts
.iso.org.dod.internet.private.enterprises.qnap.qutshero
.iso.org.dod.internet.private.enterprises.qnap.qne

## **QNAP NMS Partner Ecosystem**



### Centralized monitoring with Zabbix usning SNMP

- Zabbix installed on a NAS
- Allow NAS to access all devices
- Through SNMP, Zabbix can monitor all devices directly
- Generate reports by Zabbix



#### Distributed Monitoring with Zabbix using SNMP



	Nam	e API availability status			
	Тур	e Script ~			
Synthetic monitoring	* Ke	y api.status			Select
Synthetic monitoring	Parameter	s Name	Value	Action	
This functionality enables scripted scenarios for		API_URL	{\$URL}	Remove	
complex data collection and reliable multi-step availability		TOKEN	{\$TOKEN}	Remove	
complex data collection and reliable multi-step availability		Add			
monitoring. Support of the new metric type "Script".	* Scri	t try (		2	7
	* Timeou	it 10s			_
	Type of informatio	Numeric (unsigned) V			
	Unit	s			
	* Update interva	ll 10s			

Triggers							
All hosts / shop.example.com En Applications 17 Items 128 Trigg	abled ZBX SNMP ers 67 Graphs 25	JMX IPMI Discovery	rules 3 W	eb scenarios			
Trigger Tags Dependencies							
* Name	Abnormal traffic on	(HOST.HOS	7				
Event name	Abnormal traffic on davg(1M,now/M)} /	(HOST.HOS {{HOST.HOS	7), exceeded T}:traffic.dat	by {?({{HOS a.trendavg(1	ST.HOST} M,now/M	traffic.data.tren: 1y)}-1)*100}%	
Operational data							
Severity	Not classified	Information	Warning	Average	High	Disaster	
* Expression	<pre>{shop.example. {shop.example. {\$ABNORMALITY_</pre>	com:traffi com:traffi FACTOR}	c.data.tr c.data.tr	endavg (1M endavg (1M	, now/M) , now/M-	} > ly)} *	Add
	Expression construct	tor					

#### Zabbix Insights

Get most of your history data! A new set of trigger functions enables long-term data analysis and allows to create powerful insights, detect anomalies and system misbehaviour. Example : "Total amount of network traffic increased by 28% in September"

Applications 2 Items 11 Triggers 5 Graphs Dashboards Discovery rules Web scenarios

Item Preprocessing

#### Storage of secrets in external Vault

Integration with HashiCorp Vault enables secure storage of all sensitive information with fine-grained control access to tokens, passwords, certificates, encryption keys, API tokens, user names, etc.

ZABBIX	Configure DB c	onnection		
	Please create database ma database. Press "Next step	nually, and set the configura " button when done.	tion parameters for conn	ection to this
Welcome				
Check of pre-requisites	Database type	MySQL ~		
Configure DB connection	Database host	localhost		
Zabbix server details	Database port	3306	0 - use default port	
GUI settings				
Pre-installation summary	Database name	zabbix		
Install	Store credentials in	Plain text HashiCorp	/ault	
	Vault API endpoint	https://localhost:8200		
	Vault secret path	path/to/secret		
	Vault authentication token	aFE2ascetw23fvszxd		
	Database TLS encryption	Connection will not be encry shared memory (Windows).	ypted because it uses a s	socket file (on Unix) or
			·	

User	S				
User	Media	Permissions			
		* Role	User role X	Select	
		User type	User		
		Permissions	Host group	Permissions	
			All groups	None	
			Permissions can be assigned for use	er groups only.	
			Access to UI elements		
		Monitoring	Dashboard Problems Hosts Overve	w Latest data Screens Maps Services	
		Inventory	Overview Hosts		
		Reports	Availability report Triggers top 100		
			Access to modules		
			No enabled modules found.		
			Access to API		
			Enabled		
			Access to actions		
			Create and edit dashboards and screens	Create and edit maps Acknowledge problems Close problems	
			Change seventy [ Add problem commen	as Execute scripts	

Cancel

#### User roles to control permissions:

Now Zabbix supports flexible user roles for much more granular management of user rights to control access to various parts of Zabbix UI, API methods and user operations.

#### Monitoring of IoT and industrial equipment:

**Modbus and MQTT** – the most common IoT protocols for sensors and industrial equipment monitoring are natively supported by Zabbix now

#### Create custom views:

Zabbix provides the ability to save named complexfilters and re-use them later with one-click. It makes possible to create different problem views for different services or data centres, for example, and switch between them instantly.

#### Load balancing for UI and API

Zabbix introduces the ability to scale Zabbix UI and API components across multiple nodes for speed, HA and redundancy.



#### YAML for import/export:

Much more readable Yaml format becomes a new standard for templates and Zabbix import/export operations.





#### Built-in integrations with alerting systems

Zabbix 5.2 introduces a new set of out-of-the-box integrations with industry-standard alerting and notification systems including Slack, Pushover, Discord, Telegram, VictorOps, Microsoft Teams, SINGNL4, Mattermost, OpsGenie, PagerDuty, iLert

#### and many more...

- New QTS SNMP MIB
- SNMP MIB Client
- Zabbix





## **QuLog Center Active four major features**

#### Proactive analysis

Quick filtering

Real-time monitoring

**4** Unified management



# Console Management - Convenient NAS troubleshooting

When performing maintenance/troubleshooting, or if IT/support staff are unable to access QTS via HTTP/S, Console Management can be used to perform basic configuration and debugging. Console Management is available using SSH, Serial Console, or by connecting an HDMI display, keyboard, and mouse to the NAS.



#### Add QNAP NAS into Azure AD Domain Service

Microsoft Azure AD DS provides managed domain services such as domain join, group policy, and Lightweight Directory Access Protocol (LDAP). By adding a QNAP NAS into Azure AD DS through site-tosite VPN connection or through Windows Server using Azure AD Connect, IT staff are free from deploying and managing domain controller locally, and have greater efficiency in managing user accounts and permissions for multiple NAS devices. It provides flexibility, scalability, and extreme convenience.

Note: Azure AD DS supports x86 (Intel or AMD processor) NAS.



### **Azure AD DS and SSO**



SSO(*Single Sign-On*) providing users with a variety of independent services after logging in

Admin can manage the user's authority to use the service, but due to the authentication method (Oauth), it is only limited to Web Service

## SSO NAS settings

← ControlPanel		୦ (୧
Image: State with the state with th	Windows AD/LDAP     SS0       Image: Single Sign-on (SS0)     Image: Single Sign-on (SS0)       Client ID:     Image: Single Sign-on (SS0)       Tenant ID:     Image: Single Sign-on (SS0)       Tenant ID:     Image: Single Sign-on (SS0)       Tenant ID:     Image: Single Sign-on (SS0)       Delta Mathematic Single Sign-on (SS0)     Image: Single Sign-on (SS0)       Tenant ID:     Image: Single Sign-on (SS0)       Delta Mathematic Single Sign-on (SS0)     Image: Single Sing	
	For details on setting up SSO with Azure AD, go to Online Help.	

### **Microsoft Azure Client ID and Tenant ID**

Microsoft Azure		,P Search resources, services, and docs (G+/)		E G	Q 6	?	© -	@gmail.cor
« + Create a resource	Home > -1280u4							
🛉 Home								
📶 Dashboard	₽ Search (Ctrl+/) <	🗊 Delete 🌐 Endpoints 🐻 Preview features						
🗮 All services	. Overview	↑ Essentials						
* FAVORITES	di Quickstart	Display name : /-1280u4	Supported account types	: My organization on	У			
All resources	1 Integration assistant   Preview	Application (client) ID : 426783ca-be25-4c6e-ab11-750129aba805	Redirect URIs	: 1 web, 0 spa, 0 pub	ic client			
Resource groups	Stat 1	Directory (tenant) ID : a4efb8a5-2a20-4971-9fdc-88da526a8fd1	Application ID URI	: https://torontoioon		D 1		<u>//</u> -4d32-95d8-58
🔹 App Services	Manage	Object ID : f692c	Managed application in I	1280u4				
SOL databases	😾 Branding	Starting June 20th 2020 we will no Jonger add any new featurer to Anire Active Directory Authentication Library (ADA)	II) and Ature AD Granh We will	continue to provide tech	sical runnort i	nd carucitu	undater but	we will no longer
Azure Cosmos DB	Authentication	provide feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft	soft Graph. Learn more	continue to provide tech	near support o	in secondy	updates but i	ne winno longer
Virtual machines	📍 Certificates & secrets							
	Token configuration	C-II ADI-	D					
	<ul> <li>API permissions</li> </ul>	Call APIs	Documentation					
Storage accounts	Expose an API		Authentication scenarios					
Virtual networks	0wners		Authentication libraries Code samples					
Azure Active Directory	Roles and administrators   Preview		Microsoft Graph					
Monitor	Manifest		Help and Support					
🏟 Advisor		Build more powerful apps with rich user and business data						
Security Center	Support + Troubleshooting	from Microsoft services and your own company's data sources.						
🙎 Help + support	P Troubleshooting	View API permissions						
📑 Intune	2 New support request							
Oost Management + Billing								
		Sign in users in 5 minutes						



#### **Microsoft Azure Authentication-Reply URLs**

Microsoft Azure		P Search resources, services, and docs (G+/)
«	Home >	
+ Create a resource		
👚 Home	3	
💴 Dashboard		🔚 Save 🔀 Discard   🗢 Got feedback?
E All services	Overview	
★ FAVORITES	😃 Quickstart	Platform configurations
All resources	🚀 Integration assistant   Preview	Depending on the platform or device this application is targeting, additional configuration may be required such as redirect URIs specific authentication settings or fields specific to the platform.
Resource groups	Manago	Add a statform
🎨 App Services		Aud a platoin
🧧 SQL databases	Branding	∧ Wah
🨻 Azure Cosmos DB	Authentication	
🍷 Virtual machines	Certificates & secrets	Redirect URIs
🚸 Load balancers	I loken configuration	The URIs we will accept as destinations when returning authentication responses (tokens) after successfully authenticating users. Also referred to as reply URLs. Learn more about Redirect URIs and their restrictions man and their restrictions and the res
Storage accounts	API permissions	
Virtual networks	Expose an API	🛕 This app has implicit grant settings enabled. If you are using any of these URIs in a SPA with MSALjs 2.0, you should migrate URIs>
lactive Directory	Owners	
Monitor	Roles and administrators   Preview	http://10.19.250.62:8080/cgi-bin/loginTheme/sso/azure/main.html
🤿 Advisor	Manifest	Add URI
Security Center	Support + Troubleshooting	
8 Help + support	Troubleshooting	Logout URL
📑 Intune	New support request	This is where we send a request to have the application clear the user's session data. This is required for single sign-out to work correctly.
Cost Management + Billing		e.g. https://myapp.com/logout
		Implicit grant
		Allows an application to request a token directly from the authorization endpoint. Checking Access tokens and ID tokens

is recommended only if the application has a single-page architecture (SPA), has no back-end components, does not use the latest version of MSALjs with auth code flow, or it invokes a web API via JavaScript. ID Token is needed for ASP.NET Core Web Apps. Lear more about the implicit grant flow

### **Azure SSO Login**





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QuTS

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