### **Trisul Network Analytics - Traffic Analyzer**



Using this information the Trisul Network Analytics Netfllow for ISP solution provides information to assist the following operation groups:

- Network Operations
  - 0 Network Visibility- Monitor network traffic for network analysis
  - 0 Network Performance Monitoring- Network traffic and analysis for performance related issues
  - 0 Improved Triage
- Security Operations
  - 0 Intrusion Detection
  - 0 Identification of Unknown Threats
  - 0 Incident Mitigation & Forensics
- Architecture and Planning
  - 0 Understand Client-Server Relationships- VMWare Virtual and security level mapping for both network and application level application identification
  - 0 Physical and Virtual Host Visibility
  - 0 Trend Reporting

### System Security

Traffic Analyzer handles all Malicious Hosts, Traffic spikes, Worm Activity, Alarms associated to these security concerns, Host Information, Identify infected machines on your network, Measure malware and botnet activity, Alert when users access blacklisted websites, Monitor intrusion attempts into your network, Post compromise analysis

For Network Troubleshooting, Router and Switch Interface utilization, User Activity, Traffic entering and leaving the network, quality of service utilization, Round trip time (RTT) and Server response time (SRT) deviations, Application identification through

- Network Monitoring
- Application Monitoring and Profiling
- User Monitoring and Profiling
- Network Planning
- Accounting/Billing

**Router Traffic:** Displays the list of configured router IPs with traffic rate of Maximum, Average and Total traffic per second. The Total field shows the summary of flow data in selected time range. Click the Total value to view total router traffic graph and an option for analysis. Similarly, click Router IP to view router specifications.

**Protocol Traffic:** Displays the list of protocols with the router IPs, the protocol name, the traffic rate of Maximum, Average and Total traffic per second. The Total field shows the summary of flow data in selected time range. Click protocol name or number field to navigate to Protocol Summary page to view details of device flow using corresponding protocol.

**Application Traffic:** Displays the list of application with the router IPs, the port number, the total In traffic, Maximum traffic, the total Out traffic, Maximum Out traffic, Total traffic per second. Click values under "In" heading to navigate to the Source Summary page, and on "Out" leads to Destination Summary and click Total field to navigate to application report graph.

**Interface Traffic:** Displays the list of interface with the router IPs, the total In traffic, Maximum traffic, the total Out traffic, Maximum Out traffic, Total traffic per second. By clicking the interface the user can navigate to the interface summary page, clicking on the In or Out takes to the source summary page or Destination summary page respectively and clicking on the total it will take to the interface report graph.

**Router Traffic:** Displays the configured router IPs by traffic in a Graph. The graph shows the total traffic along the Y-axis and the time in the X-axis.

**Source Device Traffic:** Displays the list of Top N traffic source devices with the router Ips, and traffic rate of Maximum, Average and Total traffic per second.

**Destination Device Traffic:** Displays the list of Top N traffic destination devices with the router IPs, and traffic rate of Maximum, Average and Total traffic per second.

**Top Conversation Traffic:** Displays the list of Top N traffic source and destination devices with the router IPs, and traffic rate of Maximum, Average and Total traffic per second.

**Routing Traffic** : Traffic going to each Autonomous system at direct peering points, Traffic going to each Application Cache such as Google/ Facebook/ YouTube. Raw BGP analysis capability.

# SOLUTION FEATURES

This section describes the key features of the proposed solution with reference to the compliance documents.

## Autonomous system based traffic mapping

More Link: <u>https://www.trisul.org/docs/ug/ui/dashboards.html#asn\_monitoring</u>

By Enabling Netflow on Gateway Router and Switches at Peering Points you can get detailed break up of Traffic flowing to each AS Peer on a per gateway router or per-Interface level. The AS information can be obtained directly from the Router Netflow records or by the included high quality IP Prefix database.

### **Busiest UPLOAD and DOWNLOAD ASN on Gateways**

The following screenshot shows how much Traffic is flowing TOWARDS and FROM each Autonomous System connected to a Gateway Router. You can also monitor on a per country basis (next section) on each Gateway Router. You can create alerts when unexpected traffic is routed through the gateway routers such as when Country

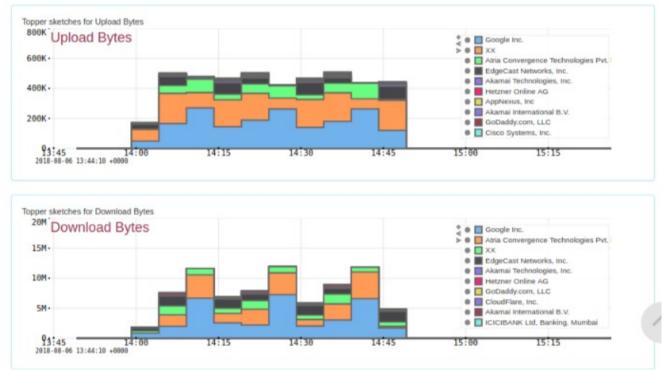
Counter Group ASNumber toppers for each r	meter		Ø 1 Hrs:51 Mins:7 Secs starting 20	18-08-06 13:36	:36 +000
0   Upload Bytes	C Toggle Labels	161.21 MB	1   Download Bytes	C Toggie Labels	2.79 GB
Google Inc. 🔤	40 9	63.81 MB	Google Inc. :==	44 % 1	22 GB
XX 💼		6 52.14 MB	Atria Convergence Technologies Pvt. Ltd. Broadband Internet Service Provider IND IA Inc.	28 % 7	91.61 MB
Atria Convergence Technologies Pvt. Ltd. Broadband Internet Service Provider IND IA Imp	12 9	18.97 MB	XX Im	13 % 3	65.38 MB
EdgeCast Networks, Inc. 😑	9%	15.03 MB	EdgeCast Networks, Inc.	11 % 33	21.14 MB
Others	2 %	3.62 MB	Akamai Technologies, Inc. 📼	1 95 35	5.07 MB
Akamai Technologies, Inc. 📄	1%	2.22 MB	Hetzner Online AG 😑	1% 3	0.68 MB
Hetzner Online AG 📄	1%	1.51 MB	GoDaddy.com, LLC 📻	1 % 2	5.00 MB
AppNexus, Inc 🔤	196	1.44 MB	Others	1 99 10	8.13 MB
Akamai International B.V.	1%	908.20 KB	CloudFlare, Inc.	0% 1	1.72 MB
GoDaddy.com, LLC 🔤	19	868.07 KB	Akamai International B.V.	0 % 1	0.71 M
Cisco Systems, Inc. 🗯	0%	744.73 KB	ICICIBANK Ltd, Banking, Mumbai =	0 % 2	35 1
+ More			+ More		

Illustration 1: Showing Traffic going to each ASN from a Gateway Router

## Capacity planning and trending of ASN Traffic on Gateway Routers

Long term monitoring and trending of every single ASN traffic profiles over days, and months help you

forecast traffic growth of important Peers and Caches. This allows you to plan ahead of time with increased capacity. The following screenshot shows ASN Traffic over time no Gateway Interfaces.



#### Counter Group ASNumber - Topper sketches over time

1 Hrs:42 Mins:20 Secs starting 2018-08-06 13:44:10 +0000

Illustration 2: Traffic Trend per ASN and Google Caches for planning

### Troubleshooting and security for ASN

Trisul includes powerful graph analytics functions that help you discover relationships between various entities. If you have unexpected traffic on AS:8388 and then if you wish to see what actual IP Addresses are involved you can simply click the AS and expand it to reveal the IP, Host names, Countries etc. Without this capability you will find it very hard to reveal this information. This is invaluable for troubleshooting, network management and security.

The following screenshot shows as AS which was seen on a particular Gateway node. By clicking it we are able to reveal the hosts on that AS for further action.

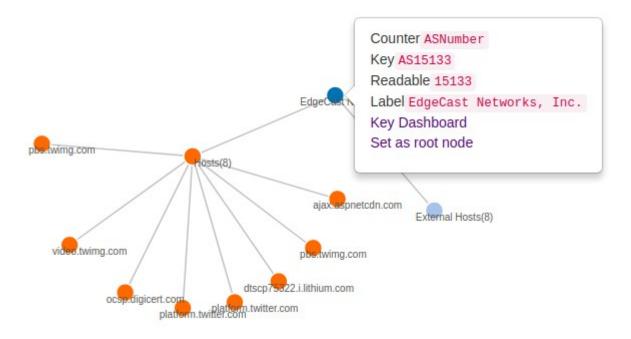


Illustration 3: EDGE Graph Analytics showing Hosts inside an AS

# Prefix based traffic mapping

Link : <u>https://www.trisul.org/docs/ug/ui/interesting\_dashboards.html#key\_space\_explorer</u>

Trisul provides very flexible tools to load your own IP Prefixes into the solution. This way you can monitor on a Prefix level per Gateway, per Circle, or nationwide. For your internal traffic you can group all your IP Endpoints into prefixes and monitor at that level. For example you can monitor 115.28.2.0/24 nationwide as one group in addition to each individual endpoint. This lets you build a high level Prefix Mapping of Traffic at country, circle, and gateway level.

## Prefix based monitoring tools

All the previous tools such as Topper Monitoring, Trending, and Edge are also available for IP Prefix based monitoring. In addition, there are some additional tools we can see here.

## **Prefix Space Monitoring**

The Prefix Space monitoring tool known as KeySpace Monitor lets you drill down into any internal or

external IP Prefix range to show usage of Ips within in. The following screenshot shows the usage ratio of IP endpoints in the Prefix 192.168.0.0/16 For ISP this allows them to track density of IP Prefix and then use to plan routing and IP Space allocation.

unter Group	Internal Hosts	•	Time Frame	2018-08-01 - 2018-08-07
Key spaces	192.168.0.0~192.168.255.255		Max Items	100
rey spaces	Enter one key range per line Example for hosts 192.168.1.10~192.168.1.20, Port-10~Pr 50 Can also use CIDR format for searching subnets 192.168.0.0/16			Approximate number of matching items to retrieve
	Search			

#### Matching keys in selected spaceClick on a match to search for flows

Time seen	Total	Keys seen in space
Tue Aug 07 2018 11:07:00 GMT+0530 (IST)	3	192.168.2.81 - 192.168.2.11 - 192.168.2.99 -
Mon Aug 06 2018 10:52:00 GMT+0530 1ST)	12	192.168.1.1 ▼ 192.168.2.81 ▼ 192.168.3.1 ▼ 192.168.3.81 ▼ 192.168.1.11 ▼ 192.168.1.22 ▼ 192.168.2. 192.168.2.19 ▼ 192.168.2.99 ▼ 192.168.3.11 ▼ 192.168.3.100 ▼ 192.168.3.255 ▼

Illustration 4: KeySpace monitor shows which IPs are used in a Prefix

## **Prefix Traffic Mapping**

Prefix based traffic monitoring allows you to not only track the inside IP but also the usage of each block or sub-prefix within the prefix. The following screenshot shows the usage of Total, Transmit, Receive of each point with a Prefix Range. This feature is called Prefix Key-Space Explorer.

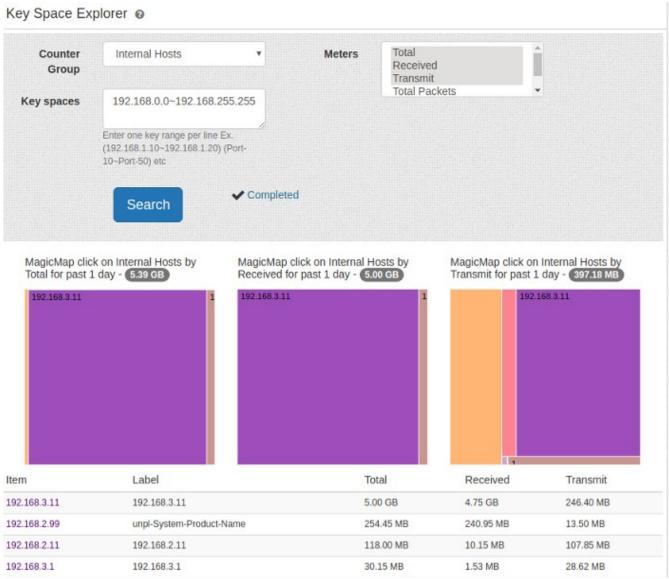


Illustration 5: Traffic mapping of each IP within a Prefix

# Location based traffic mapping

More Link : https://www.trisul.org/docs/ug/ui/dashboards.html#country\_location\_based\_traffic\_monitoring

Tracking traffic per country, region, or city is a crucial capability of any Network Analytics solution. Trisul allows you to maximum flexibility to track traffic down to the City or area level. This feature can be enabled at the national, circle, or gateway level or even per-interface.

### Location traffic per Gateway Interface

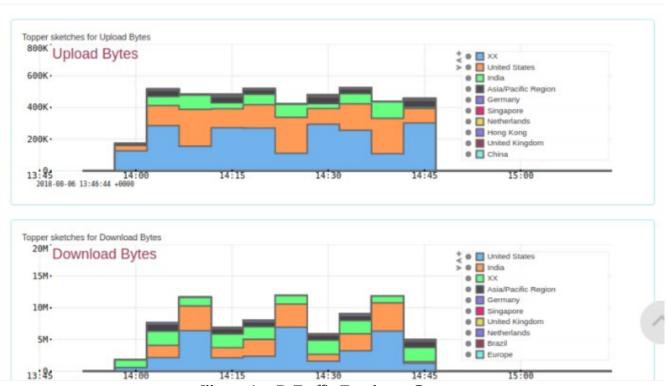
The following screenshot shows upload and download bytes on a per Country Basis on a particular Gateway. This allows you to verify your routing policies. You can click on any country to drilldown into it or view trends.

Counter Group Country	toppers for e	ach meter 🕘 1	Days:1 Hrs:37 Mins sta	rting 2018-08-0	)6 12:23:00 +	000
)   Upload Bytes	C Toggle	Labels 279.84 MB	1   Download Bytes	C Tog	gle Labels 4.92	2 GB
XX 📼	48 %	133.14 MB	United States	41 %	2.03 GB	
United States 💼	33 %	92.07 MB	India 💼	29 %	1.42 GB	
India 💼	13 %	35.59 MB	XX 💼	22 %	1.06 GB	
Asia/Pacific Region 💼	5 %	13.53 MB	Asia/Pacific Region 💼	6 96	306.78 MB	
Germany 💼	1 %	2.73 MB	Germany 📻	1 %	60.82 MB	
Singapore 📰	1 96	1.77 MB	Singapore 📰	1 96	41.00 MB	
Others	0 %	325.20 KB	United Kingdom 💼	0 96	2.81 MB	
Hong Kong 💼	0 96	251.66 KB	Netherlands 💼	0 %	1.74 MB	
Netherlands 💼	0 %	231.74 KB	Others	0 %	1.35 MB	
United Kingdom 📼	0 %	142.09 KB	Brazil 📰	0 %	1.13 MB	
Canada 💼	0 %	71.48 KB	Europe 🔤	0 %	882.13 KB	~

Illustration 6: Traffic upload and download per Country / Gateway

## Long term Trends per Location for capacity planning

The following image shows Traffic per location. You can observe which City (Chennai, Delhi, Kochi, etc.) are growing and use that for business planning or capacity planning.



Counter Group Country - Topper sketches over time

1 Hrs:27 Mins:27 Secs starting 2018-08-06 13:46:44 +0000

Illustration 7: Traffic Trends per Country

## Showing High Traffic endpoints on Geo MAP

This map shows you where the top Location wise traffic IP sources and destinations are for a gateway or for the entire network.

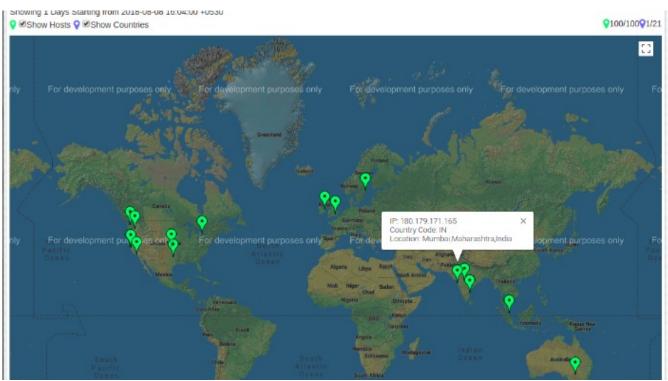


Illustration 8: Traffic shown on Geo Map

# Dashboards

### Link: https://www.trisul.org/docs/ug/ui/dashboards.html#default\_dashboards

Features very powerful dashboarding for all Time-Series measurements, Top-N lists, alerts, summary pages, live views. Users can easily create their own dashboards showing their preferred event counters, time-series charts. Trisul out of the box supports 150-200 metrics. Metrics like TCP round trip time, latency. Custom QoS metrics requested like can be monitored by IP SLA features on routers. The following metrics monitored by IP SLA compatible networks can be added to any dashboard.

- •Delay (both round-trip and one-way)
- Jitter (directional)
- Packet loss (directional)
- •Packet sequencing (packet ordering)
- •Path (per hop)
- •Connectivity (directional)
- •Server or website download time

This can be shown for paths containing audio (VoIP) or Video traffic. Video duration played from sources like YouTube, Netflix, Amazon Prime can be monitored by flow based techniques. The solution allows customized monitoring depending on the video platform.

Some sample dashboards are shown in the next section.

### **Events and counters**

The Totals dashboard shows all the various event counters over a selected time period. The items include Unique AS, Unique Countries, Unique Hosts, Router Interfaces, and dozens of other counter groups. You can also see security related counter like IDS alerts, threshold crossing alerts, threshold band alerts. Etc

100 M Set 50 M	Total Bytes			Total Packets	7
Total Duration 1 d 7 h 1 m Starting fi 05:22:00 UTC	rom 2018-08-06	Total Bytes 21.03 G	Total Packets 26.88 M	Total Flows 161.17 K	IDS 38.71 K
Blacklist 65	Threshold Crossing	Flow Tracker	System Alerts	Threshold Band 0	HTTP URIS
DNS Resources 15.56 K	SSL Certs 7.86 K	File Hashes	HTTP Headers	FTS SSL Certs 840	FTS DNS Records
Unique ASNumber 70	Unique Aggregates 10	Unique Alert Classes 10	Unique Alert Priorities	Unique Alert Signatures 27	Unique Apps
Unique Base Domains 308	Unique Blacklist	Unique Country 21	Unique Dir Mac 46	Unique External Hosts 577	Unique HTTP Content Types 23
Unique HTTP Hosts 37	Unique HTTP Methods	Unique HTTP Status Codes 7	Unique HTTP URL Category	Unique Hosts 842	Unique HostsIPv6 29
Unique ICMP Types 3	Unique Internal Hosts 371	Unique JA3 PRINT 5	Unique LinkLayerStats 1.22 K	Unique Long Fat Tail Hosts 10	Unique Long Thin Tail Hosts 17
Unique Mac 30	Unique Meta Counter Group 53	Unique Meta Session Group	Unique NetworkLayerStats	Unique Perf- Stats 8	Unique Prune- PCAP 5
Unique SNI 498	Unique TCP Analyzer 564	Unique TLS CAs 26	Unique TLS Ciphers 12	Unique TLS Orgs 173	Unique VLANStats

Illustration 9: Events and counters dashboard

# Network summary dashboard.

https://www.trisul.org/docs/ug/ui/dashboards.html#live\_network\_summary\_dashbo ard

A Live Network Summary dashboard showing KPI at the top level for management and high level NOC operations. It shows live usage, bandwidth, security event counts, top hosts, top Apps. This can be customized to show any relevant KPI of importance to the teams using it.

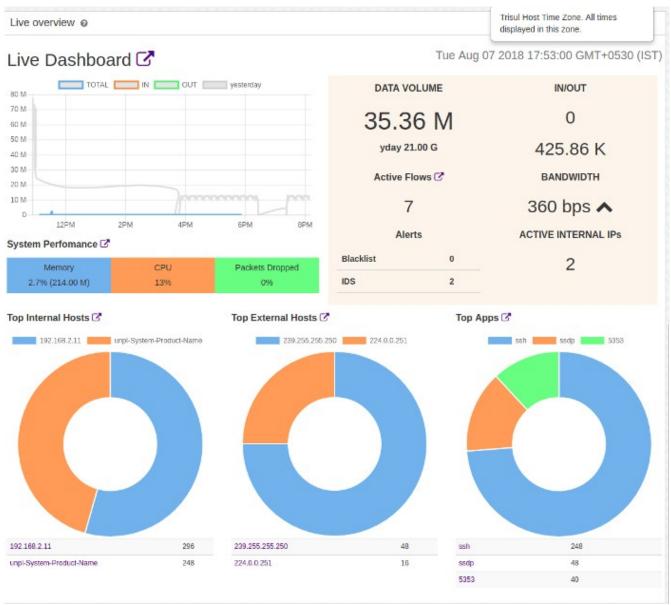


Illustration 10: Network summary dashboard

# **Routing Efficiency Dashboards**

40 (f) Routing Efficiency Dashboard: Control network costs and build business cases for capital projects to gain a complete understanding of interconnect relationships. YES ASN, IP, dashboards

Routing efficiency consists of monitoring IGP and EGP link traffic and also traffic at the interconnects. The solution will monitor IGP links between interconnects, inter-circle, for traffic utilization. The interconnect links with peers are also monitored for long time trending and storage. All the links on routers are autodiscovered from Netflow traffic exported from them. This information can be combined with tools like BGPPlay to simulate and build business cases.

+	Sele	ect a time i	interval											
		Tim	e Frame	2018-04-06	12:59:00 - 2018-04	4-06 13:14:	00 -							
+	Sele	ect a route	r / Showing	g 2 routers of to	otal 2 / Time Inte	rval : 15 n	n ending	g 2018-	04-06 13:14	:00 filter r	outers		Ор	otions 🕶
	¢ Ro	outer IP	♦ Name		Interfaces	Flows	Total	Volume	Or	tions	118.102.225	.210_1 "C	ARRIE SPENCE -NO -AIRCE 45	
=	.10	02.225.210	118.102. <mark>2</mark> 25.2	210	13	40.20 K		52% 42	5.07 M Opt	ions -		LO Z	-NO -AIRCE 45 lbps"	
	68.		"INMAA-PULS NOC.PULSE.	SE-SPENCER- IN"	15	255 K		47% 37	9.71 M Opt	ions -				
												0 100 000 7	PULS	
												TOT	VOICESER	VER
											MagicMap cli	ck on interfac	ce grouped b	y
											MagicMap cli router	ck on interfac	ce grouped b	у
	Cliel		ter Interfe	o / Chowing 15			15 for a					0.377	<u>(())</u>	у
+	Clic	k on a rou	ter interfac	e / Showing 15	active interface	es of total	15 for n	outer 58	3.68.43.110			ck on interfac	<u>(())</u>	y
+		k on a rout	ter interfac ¢ Name		active interface		15 for m				router	filter interf	<u>(())</u>	y
+			\$ Name				tal Volun		♦ Last BV	¢ Last BW	router	filter interf	faces	
*	*	Interface	♦ Name	2	AIRCEL-45Mbps"		tal Volun 51%	ne	◆ Last BW IN 2.01 Mbps	/ ◆ Last BW Out	router ↓ ↓ Util%	filter interf ≑ In 202.55 M	faces ¢ Out	Options
*	*	Interface .68.43.110_1 .68.43.110_1	Name CARRIEF 1 "PULSE(V	R-SPENCER-NOC-A	AIRCEL-45Mbps" PENCER"		tal Volun 51% 41%	ne 388.64 M	◆ Last BW IN 2.01 Mbps	<ul> <li>Last BW Out</li> <li>1.87 Mbps</li> <li>1.61 Mbps</li> </ul>	router ↓ Util% 0	filter interf ≑ In 202.55 M	faces	Options Options
*	; 9 9	Interface 68.43.110_1 68.43.110_1 68.43.110_1	<ul> <li>Name</li> <li>"CARRIEF</li> <li>"PULSE(V</li> <li>"PULSE(C</li> </ul>	R-SPENCER-NOC-A	AIRCEL-45Mbps" PENCER" NCER"		tal Volun 51% 41% 5%	ne 388.64 M 317.84 M	<ul> <li>◆ Last BW IN</li> <li>2.01 Mbps</li> <li>1.61 Mbps</li> </ul>	<ul> <li>Last BW Out</li> <li>1.87 Mbps</li> <li>1.61 Mbps</li> </ul>	vouter ↓ Util% 0 3	filter interf	faces	Options Options Options
*	; 9 9	Interface 68.43.110_1 68.43.110_1 68.43.110_1 68.43.110_6	Name     CARRIEF     "CARRIEF     "PULSE(V     "PULSE(C     "XCONNE	R-SPENCER-NOC-A /OICESERVERS)-SI DNS-SERVER)-SPEI	AIRCEL-45Mbps" PENCER" NCER" R-PRY"		tal Volun 51% 41% 5% 1%	ne 388.64 M 317.84 M 40.72 M 8.54 M	<ul> <li>Last BW</li> <li>2.01 Mbps</li> <li>1.61 Mbps</li> <li>176.19 Kbps</li> </ul>	<ul> <li>✓ Last BW Out</li> <li>1.87 Mbps</li> <li>1.61 Mbps</li> <li>219.64 Kbps</li> </ul>	router	<ul> <li>Filter interf</li> <li>♦ In</li> <li>202.55 M</li> <li>157.59 M</li> <li>17.99 M</li> <li>0</li> </ul>	€ Out 186.09 M 160.25 M 22.73 M	Options Options Options Options
* * *	*	Interface 68.43.110_1 68.43.110_1 68.43.110_1 68.43.110_6	<ul> <li>Name</li> <li>"CARRIEF</li> <li>"PULSE(V</li> <li>"PULSE(I</li> <li>"XCONNE</li> <li>"PULSE-II</li> </ul>	R-SPENCER-NOC-A /OICESERVERS)-SI DNS-SERVER)-SPEI ECT-INMAA-TNAGAI PPBXSERVERS-SP	AIRCEL-45Mbps" PENCER" NCER" R-PRY"	¢ To	tal Volun 51% 41% 5% 1%	ne 388.64 M 317.84 M 40.72 M 8.54 M 1.03 M	<ul> <li>Last BW</li> <li>2.01 Mbps</li> <li>1.61 Mbps</li> <li>176.19 Kbps</li> <li>0bps</li> <li>5.77 Kbps</li> <li>0.10 Kbps</li> </ul>	<ul> <li>Cast BW Out</li> <li>1.87 Mbps</li> <li>1.61 Mbps</li> <li>219.64 Kbps</li> <li>84.40 Kbps</li> </ul>	<ul> <li>couter</li> <li>↓ Util%</li> <li>0</li> <li>3</li> <li>0</li> <li>84</li> </ul>	filter interf	¢ Out 186.09 M 160.25 M 22.73 M 8.54 M	Options Options Options Options Options
	÷ 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Interface 68.43.110_1 68.43.110_1 68.43.110_1 68.43.110_6 68.43.110_1	<ul> <li>Name</li> <li>"CARRIEF</li> <li>"PULSE(V</li> <li>"PULSE(C</li> <li>"XCONNE</li> <li>"NEDIASE</li> </ul>	R-SPENCER-NOC-A VOICESERVERS)-SI DNS-SERVER)-SPEI ECT-INMAA-TNAGAI PPBXSERVERS-SP ERVE-EGMORE-PC	AIRCEL-45Mbps" PENCER" NCER" R-PRY" ENCER"	¢ To	tal Volun 51% 41% 5% 1% 0%	ne 388.64 M 317.84 M 40.72 M 8.54 M 1.03 M 774.02 K	<ul> <li>Last BW</li> <li>IN</li> <li>2.01 Mbps</li> <li>1.61 Mbps</li> <li>176.19 Kbps</li> <li>Obps</li> <li>5.77 Kbps</li> <li>3.18 Kbps</li> </ul>	<ul> <li>C Last BW Out</li> <li>1.87 Mbps</li> <li>1.61 Mbps</li> <li>219.64 Kbps</li> <li>84.40 Kbps</li> <li>4.50 Kbps</li> </ul>	vouter	filter interf	Faces	Options Options Options Options Options Options

Illustration 11: Showing utilization and KPIs of router IGP and EGP links

# **Real Time Dashboards**

https://www.trisul.org/docs/ug/ui/dashboards.html#real\_time\_traffic

Powerful real time views are available for all metrics in Trisul at 1-sec, 5-sec, and 1-min duration. There are over 150-200 metrics available out of the box in Trisul to view in real time. Additional metrics like Video views, or any type of content based policy views can be easily added.

### **Real Time traffic view**

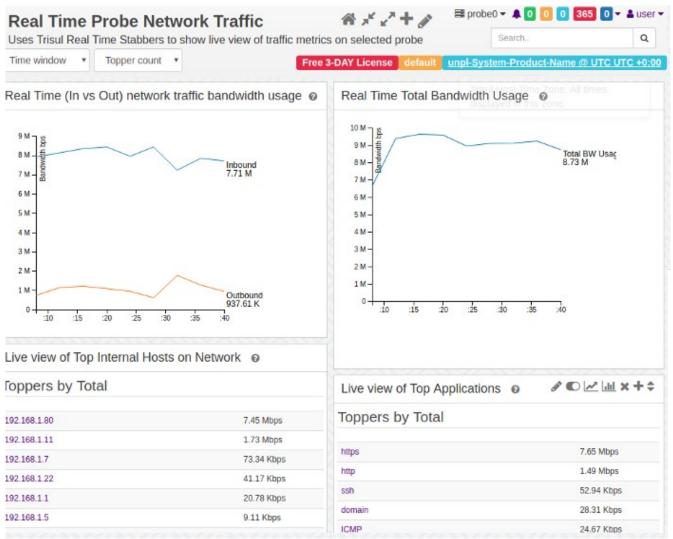


Illustration 12: Real time network traffic view

# **IPv6 Transition Dashboards**

IPv6 is fully supported based on Packet Capture and Netflow v9. Top internet applications adopting IPv6 are monitored and show. The IPv6 adoption internal to the ISP network is also shown. The following screenshots show IPv6 adoption rate showing top IPv6 users as well as the top flows (video, apps, chat) using IPv6.

Counter Group HostsIPv6 to	ppers for each	meter	⑦ 6 Mins starting 2018-08-09 09:24:00 +00				
0   Total	C Toggle	Labels 118.36 KB	1   Received		C Toggle Labels	59.47 KB	
ff02::2 📼	25 %	29.00 KB	ff02::2 💼	49 %	29.00 KB		
ff02::fb 🖮	11 %	12.60 KB	ff02::fb 💼	21 %	12.60 KB		
fe80::2e0:20ff:fe1b:1619 💼	11 %	12.60 KB	ff02::16 📻	15 %	8.79 KB		
fe80::6670:2ff:fe08:9db4 💼	9 %	10.55 KB	#02::1:#7f:3712 📰	5 %	2.93 KB		
Others	9 %	10.25 KB	ff02::1:2 💼	4 %	2.34 KB		
fe80::6670:2ff:fe08:7ad1 💼	8 %	9.38 KB	ff02::1:ff08:9db4 💼	2 %	1.17 KB		
ff02::16 📧	7 %	8.79 KB	ff02::1:ff08:7ad1 💼	2 %	1.17 KB		
fe80::9ed6:43ff:fee3:b720 📰	7 %	8.20 KB	Others	1 %	900 B		
te80::2c2:c6ff:fe7f:3712 💼	6 %	7.62 KB	#02::1:##7:5c39 💼	1 %	600 B	1	
:: 💌	5 %	6.45 KB					
ff02::1:ff7f:3712 📰	2 %	2.93 KB					

Illustration 13: IPv6 Adoption Top users

**TOP IPv6 Flows APPS can be video, apps, file transfers etc.** 

									Cols	\$ <b>*</b>
Proto	Src IP	Src Port	Dst IP	Dst Port	Volume	StartTime	Duration	Probe Tags		
IPv6- ICMP	fe80::429b:cdff.fe75:7e0d	0	#02::1	0	54.09 K	Thu Aug 09 2018 11:07:24	4 h 29 s	probe0	options	0
IPv6- ICMP	ff02::1	0	fe80::429b:cdff:fe75:7e0d	0	774	Thu Aug 09 2018 11:05:10	6 m 23 s	probe0	options	*
UDP	fe80::429b:cdff:fe75:7e0d	5353	ff02::fb	5353	394	Thu Aug 09 2018 11:06:22	0 s 0 us	probe0	~	÷
IPv6- ICMP	ff02::1	0	fe80::429b:cdft:fe75:7e0d	0	86	Thu Aug 09 2018 11:24:13	0 s 0 us	probe0	-	*

Illustration 14: IPv6 Top Application flows

## **Traffic Management Dashboards**

40i) Traffic Management Dashboard: To plan congestion management policies based on the granular insight provided by the Traffic Management Dashboard, then view the positive impact.

#### https://www.trisul.org/docs/ug/ui/interesting\_dashboards.html#monthly\_summary\_dashboard

Trisul monitors 200+ KPI of traffic metrics at 1 minute resolution without any roll ups or summarizations for long term analytics. Advanced statistical metrics like cardinality counters (eg unique applications per host) and top-N snapshots are all enabled out of the box. A few of the hundreds of metrics are Hosts, Applications,, Countries, AS Numbers, Routers, Ports, etc.Network flows are analyzed and stored in a custom built database engine designed for very fast storage and retrieval. The Netflow Interface Tracker is a streaming analytics algorithm that lets you generate long term accurate drilldowns of interface usage.

### **MONTHLY Traffic Management**

June							July						August
ų		Mo		Tu		We		Th		Er		Sa	
L		2		3		4		5		6		7	
iotal	42.18 GB	Total	1312.90 GB	Total	1351.58 GB	Total	1313.92 GB	Total	1343.81 GB	Total	1363.94 GB	Total	82.18 GE
3		9		10		11		12		13		14	
lotal	41.58 GB	Total	1326.65 GB	Total	1383.60 GB	Total	1365.79 GB	Total	1440.93 GB	Total	1332.11 GB	Total	97.99 GB
15		16		17		18		19		20		21	
Total	46.73 GB	Total	1292.60 GB	Total	1325.65 GB	Total	1398.99 GB	Total	1503.63 GB	Total	1376.53 GB	Total	88.47 GB
22		23		24		25		26		27		28	
otal	44.73 GB	Total	1394.17 GB	Total	1496.80 GB	Total	1483.73 GB	Total	1484.27 GB	Total	1341.92 GB	Total	67.15 GE
29		30		31		1		2		3		4	
Total	43.17 GB	Total	1387.95 GB	Total	1428.90 GB								
al Mon	thly Usage	////	777.577	7.6	2777692		977769.	227	SALVAN	7/2	CVYZKU	7//	5777755
a mon	any oblige												

This can be used for planning or billing activities on a monthly basis.

Monthly totals for Aggregates(TOTALBW) | Total 31004.54 GB

Illustration 15: Monthly traffic managment totals on a calander tool

## Long term traffic management chart

Study the congestion of any parameter on any link on long term basis by the Long Term Charts tool.

ent / p-0050 / http	5				
Counter Group	ASNumber	•	Time Frame	2018-08-03 - 2018-08-09	
Meters	Upload Bytes Download Bytes Uniques Uniques	Ļ	Business Hour From	00:00 Enter time as eg(09:50:10 or 09:59:20 PM	
ltem	comma separated		Business Hour To	23:59 Enter time as eg(09:50:10 or 09:59:20 PM	
Surface Type	AREA	•	Bucket size	0 Smooth traffic statistics over x seconds	
	Analyze				

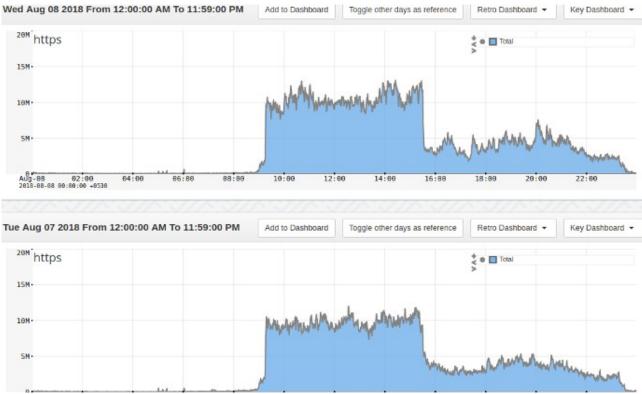


Illustration 16: Long Term traffic charts

## Usage management dashboard and segmentation features

https://www.trisul.org/docs/ug/cg/custom.html#filtered\_counter\_groups

Traffic segmentation refers to the process of setting up filters and groups so you can see where traffic sources and destinations are and this can help tailor your services. Trisul includes various segmentation tools – such as Filtered Counters, Key Set Counters, and Rule Based Counters.

Filtered Counters – segment based on one filter

fy the parent and filter criteria	
Counter Group Name	A name for the new counter group
Description	Optional description
Parent Group	Please select  The parent group is the superset that you want to filter on.
Filter Group	Please select  The parent group will be filtered using this counter group. The Key List below belong to the filter group
Key List	Filter Keys: Comma separated list of keys/ranges: Port-80, 192.168.1.2, Port-5000~Port-8000,
Inverse Key List	192.168.1.1~192.168.1.255
	Inverted filter keys: the parent will be filtered by all keys Except those in this list.

## **KEYSET Counter Group**

Monitor traffic based on a group criteria. Such as a set of IP ranges, Locations, Services, Traffic Sources, Destinations and monitor as one group.

New Keyset Counter Group	
Just specify the counter group name, y	rou will be adding keys later
Keyset Counter Group Name	1
Description	
Parent Group	Please select
	Create

Illustration 17: Create monitoring groups using KeySets

### **Rule Based Counter Groups**

Most flexible, specify any arbitrary rule to meter traffic. Such as Port Ranges applicable to a set of IP Addresses as Video Traffic.

New Rule Based Counter G go back and add your rules	Group Give your custom counter group a name, then
Enter details of new counter group, y	ou will add rules to this later
Rule Based Counter Group Name	
Description	
Parent Group	Please select
	Create

# **Capacity planning dashboards**

40 I) Capacity Planning Dashboard: Gain insight into your Traffic Management deployment to manage congested resources and measure overall business benefit with the Capacity Planning Dashboard YES

Trisul includes over 20 tools to analyze traffic for long term capacity planning. Keey track of usage growth of all KPI and set alerts when they cross a certain threshold.



Illustration 18: Long term capacity planning by Retro Tools

## Latency measurement from customers to different destinations

There are two methods to calculate latencies supported by Trisul. The first is the built in PING monitor which measures latency and uptime of several destinations and also customer IP You can also use Cisco compatiable IP SLA features to setup SLA monitoring and then report on them using SNMP from Trisul.

OTAL 298 UP 27	DOWN 20 PKTLOSS 0	Filt	er	PIN	G Groups Norn	nal • Dyna	amic •
pdated 2018-08	3-09 15:50:00 +0530	≜ State	+ Last Change IST	≜ Since	Latency (ms)		‡ Info
-		ок	2018-08-09 15:43:02	6 m 58 s	15.218	0	
		OK	2018-08-09 15:40:13	9 m 47 s	150.983 🕍	0	
		OK	2018-08-09 15:40:13	9 m 47 s	13.533 📥	0	
		OK	2018-08-09 15:40:13	9 m 47 s	11.48 📥	0	
		ок	2018-08-09 15:40:13	9 m 47 s	8.438 📥	0	
		OK	2018-08-09	9 m 47 s	7.212	0	=

Illustration 19: Latency and Uptime from Trisul BULKPING monitor

## **TCP Quality Analysis**

The TCP Analyzer provides per session monitoring of Round Trip Latency, Retransmissions, Timeout counts, and highlights the Ips and Segments facing the worst experience.

Choose a counter group							TCP Analyzer		
Recent / Country	/ Flow-ASN / Apps	HostsIPv6	/ TCP Analyzer						
Topper counts	📥 Topper trends	Bottom	counts						
ounter Group TC	CP Analyzer topper	s for each	meter	© 5 Hrs:24 Mins starting 2018-08-09 11:06:00 +053					
Latency Extern	al		C Toggle Labels	17.11 Kus	3   Retrans External		C Toggle Labels	660 pkts	
209.58.139.151 📼		19.9	1 Kus		192,168,3,81	50 %	331 pkts		
54.208.26.186			1 Kus		172.217.163.46	14 96	95 pkts		
64.233.184.94		11.3	IB Kus		Others	13 %	87 pkts		
192.168.3.81			Kus		43.254.108.118	11 %	73 pkts		
50.17.52.222			Kus		144.2.1.1	3 %	17 pkts		
172.217.163.38			Kus		172.217.31.196	2 %	14 pkts		
52.48.130.13			Kus		104.122.5.138	2 %	12 pkts		
151.139.104.167			Kus		216.239.32.27	2 %	10 pkts		
52.94.232.73			Kus		216.58.196.165	1 96	B pkts		
192.30.253.116			Kus		172.217.26.170	1.96	7 pkts		
192.00.200.110 ms		0.00	1940		172.217.160.132	1 96	6 pkts		
					+ More	1 70	o pros		
Retrans Rate E	xternal		C Toggle Labels	Opercent	6   Poor Quality Flows		C Toggle Labels	22 flws	
172.217.163.81 📼		Oper	rcent		192.168.3.81	50 %	11 flws		
13.229.43.61 💼		Oper	rcient		216.58.197.74 💼	9.96	2 flws		
172.217.160.132		Oper	rcent		13.229.43.51 📼	9.96	2 flws		
104.122.5.136 📰		Oper	rcent		172.217.163.49 📰	5 %	1 flws		
157.240.13.14 📰		Oper	rcent		172.217.163.35 📰	5 %	1 thvs		
172.217.160.141 💼		Oper	rcent		157.240.13.14 📷	5 %	1 flws		
216.58.220.3 💼		Oper	rcent		216.239.32.27 💼	5.96	1 flws		
172.217.163.49		Oper	rcent		216.58.220.3 💌	5 96	1 flws		
216.239.32.27 💼		Oper	rcent		216.58.196.161	5 %	1 flws		
Timeouts			C Toggle Labels	242 flws					
192.168.3.81 💼		50 %	121 flws						
Others			42 flws						
216.58.196.163 📼			16 flws						
172.217.163.46 🔤		6 96	14 flws						
172.217.163.35 💼		5 %	11 flws						
216.58.195.161 📖			9 flws						
172.217.163.33 💼		3 %	7 flws						
216.58.196.174 📾		2 96	6 flws						
172.217.31.193 💼		2 %	6 flws						
216.239.32.27 💼		2 96	5 flws						
172.217.160.131 📼		2 96	5 flws						
+ More									

### **APPENDIX**

Added advantage using flow analysis:

- Added Layer of Security
- Increased Application Awareness
- Verify bandwidth Utilization
- Improved Troubleshooting
- Capacity Planning

### **Analytics Dashboard**

Top Bandwidth Servers, Consumers and services both inbound and outbound: This is a view of our Threats overview with Top Bandwidth:

### **Traffic Monitoring and Reporting**

Real time monitoring of traffic over 100 KPIs tracked. It provides, complete visibility of network users, Alert on thresholds, Hosts/ ISP/ App/ Layer 2/ HTTP meters/ and Country – over 100 ways to analyse.

There are numbers of inbuilt reports and dashboards for flow analysis, if still user doesn't satisfy then Report Designer is available to build it yourself or with help from our technical support.

### IP or Application Investigation

Investigate any activity of the IP and track down other hosts that might be infected and visibility of alerts and Malware affected IPs in single page,

**Netflow Summary**