

Open Source  
**MANO**

Keysight IxLoad for OSM Hackfest

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**MANO**

Who is Keysight?

# A Brief History of Keysight



## **1939–1998: Hewlett-Packard years**

A company founded on electronic measurement innovation



## **1999–2013: Agilent Technologies years**

Spun off from HP, Agilent became the World's Premier Measurement Company

In September 2013, it announced the spinoff of its electronic measurement business



## **2014+: Keysight years**

On November 1, Keysight became an independent company focused on the electronic measurement industry

# Technology Innovation is Driving Perpetual Change

## Keysight is accelerating innovation to connect and secure the world



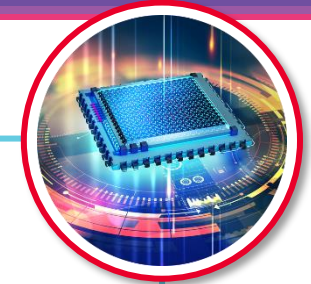
### WIRELESS

\$3.6T 5G mobile value chain by 2035<sup>1</sup>



### AUTOMOTIVE

70% of new vehicles and trucks shipped will be connected by 2023<sup>2</sup>



### QUANTUM

Nations investing >\$10B through 2024 for leadership<sup>3</sup>



### NETWORKING / CLOUD

Data center capacity expected to grow 4X by 2022<sup>4</sup>



### IOT

127 new IoT devices connected to the internet every second<sup>5</sup>



### AEROSPACE / DEFENSE

New satellite launches could grow 3X by 2025<sup>6</sup>



<sup>1</sup> Qualcomm 5G Economy. <sup>2</sup> Statista March 2019. <sup>3</sup> HSRC 2018. <sup>4</sup> Various industry sources. <sup>5</sup> McKinsey Global Institute 2017. <sup>6</sup> MIT Technology Review.

We challenge the infrastructure, harden security  
and visualize the applications



## **VISIBILITY**

- ✓ Improve network and application visibility and performance



## **SECURITY**

- ✓ Find and eliminate security vulnerabilities



## **TEST**

- ✓ Validate network and security equipment performance and application Quality of Experience



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Tool of choice: IxLoad



# Introducing IxLoad

IxLoad provides converged multiplay service emulation to validate the **quality of experience** of real-time and business-critical application services

Multiplay Service Delivery Over Wired & Wireless Networks



Application  
Delivery



Video  
Delivery



Voice  
Delivery



Security



Storage

# IxLoad GUI

The screenshot displays the IxLoad GUI interface. The top menu bar includes File, Home, Reports, Views, Traffic, and Network. Below this is a toolbar with buttons for Start Test, Stop Test, Graceful Stop, Apply Config, Release Config, Network Wizards, Traffic Wizards, ScriptGen, Media Settings, Test Composer, Test Options, Export Rxf to RM, Import Rxf from RM, and Profiles. The main workspace is divided into several panels. On the left is the Navigation Panel, which contains a Test Overview section and a Networks and Traffic section. The Networks and Traffic section is expanded, showing Scenario1, which includes an Originate section with Traffic1@Network1, a DUT section, and a Terminate section with Traffic2@Network2. The right side of the main workspace is divided into two main sections: Networks and Traffic - Scenario1, and Network1. The Networks and Traffic - Scenario1 section shows a diagram with Network1 (Traffic1, HTTPClient1) and Network2 (Traffic2, HTTPServer1) connected via a DUT. The Network1 section shows a Stack-2 configuration with IP-1 and MAC/VLAN-1. Below the Network1 section is a table with columns: Enabled, Name, Status, IP Type, Address, Mask, Increment, Count, Gateway, and Gateway Increment. The table contains one row with the following data: 1, [checked], IP-R1, Negotiated, IPv4, 10.10.0.1, 16, 0.0.0.1, 100, 0.0.0.0, 0.0.0.0. At the bottom of the main workspace is the Log/Event viewer, which shows a table with columns: Time, Severity, Category, and Message. The table contains four rows of log entries.

Test controller

- Start
- Stop
- Graceful Stop

Navigation Panel

- Configuration
- Stats
- Analyzer → Network Capture

Adaptive canvas

- It depends on Navigation panel

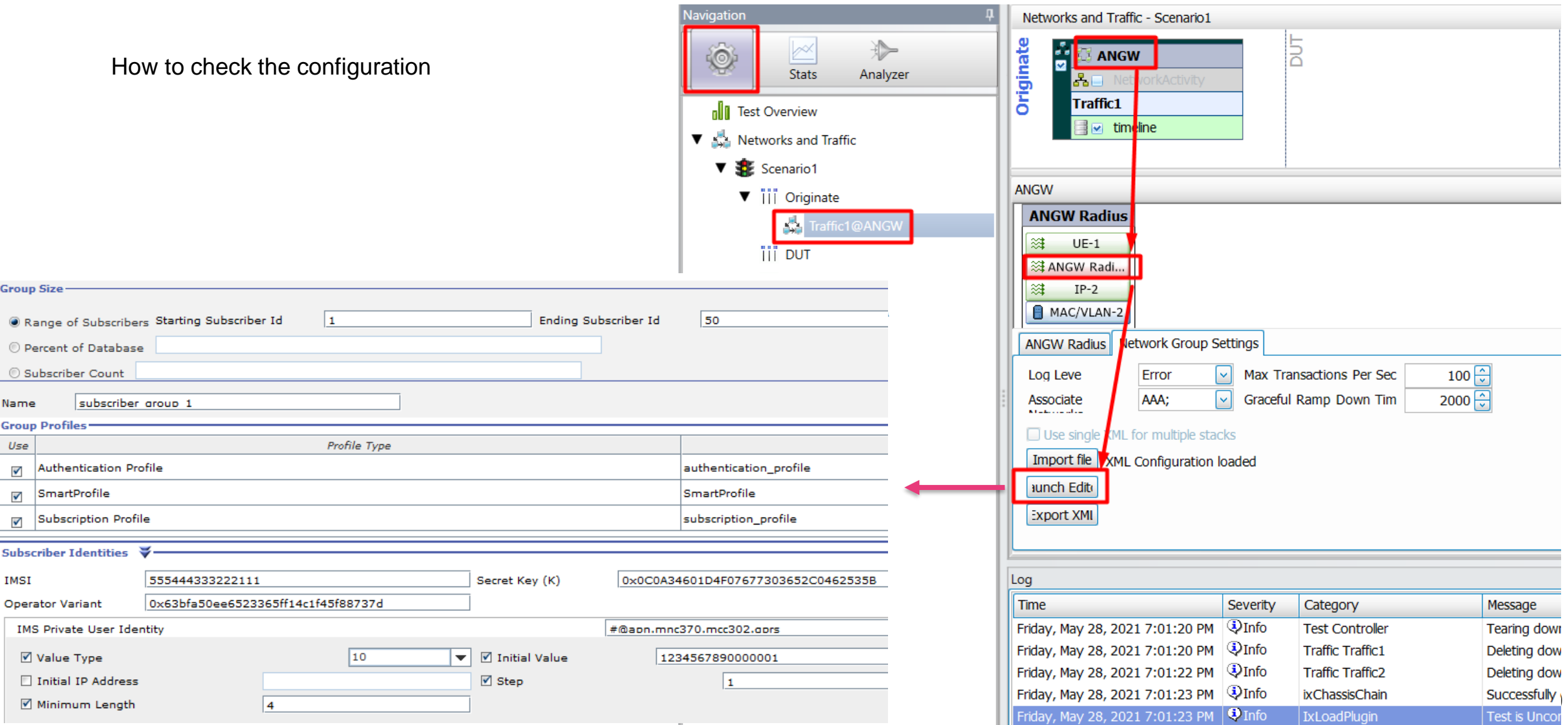
Log/Event viewer

Time	Severity	Category	Message
Friday, May 28, 2021 7:47:44 PM	Info	Licensing	Checking in license for test Test1...
Friday, May 28, 2021 7:47:44 PM	Info	Licensing	Checking in license for feature(s) VM-IXL-TIER3 for ch
Friday, May 28, 2021 7:47:44 PM	Info	Licensing	License check in succeeded for test Test1.
Friday, May 28, 2021 7:47:45 PM	Info	IxLoadPlugin	Test has Stopped.



# Radius Configuration

How to check the configuration



The screenshot displays the Open Source MANO configuration interface. The left sidebar shows the navigation tree with 'Settings' (gear icon) and 'Traffic1@ANGW' highlighted. The main panel is divided into two sections: 'Group Size' and 'Group Profiles'.

**Group Size:**

- Range of Subscribers: Starting Subscriber Id: 1, Ending Subscriber Id: 50
- Percent of Database: [Empty]
- Subscriber Count: [Empty]
- Name: subscriber group 1

**Group Profiles:**

Use	Profile Type
<input checked="" type="checkbox"/>	Authentication Profile
<input checked="" type="checkbox"/>	SmartProfile
<input checked="" type="checkbox"/>	Subscription Profile

**Subscriber Identities:**

IMSI: 555444333222111, Secret Key (K): 0x0C0A34601D4F07677303652C0462535B

Operator Variant: 0x63bfa50ee6523365ff14c1f45f88737d

IMS Private User Identity: #@apn.mnc370.mcc302.oprs

**Radius Configuration:**

- Log Level: Error
- Associate: AAA
- Max Transactions Per Sec: 100
- Graceful Ramp Down Tim: 2000
- Use single XML for multiple stacks: [Unchecked]
- Import file: XML Configuration loaded
- Launch Edit: [Highlighted]
- Export XML: [Button]

**Log:**

Time	Severity	Category	Message
Friday, May 28, 2021 7:01:20 PM	Info	Test Controller	Tearing down
Friday, May 28, 2021 7:01:20 PM	Info	Traffic Traffic1	Deleting down
Friday, May 28, 2021 7:01:22 PM	Info	Traffic Traffic2	Deleting down
Friday, May 28, 2021 7:01:23 PM	Info	ixChassisChain	Successfully
Friday, May 28, 2021 7:01:23 PM	Info	IxLoadPlugin	Test is Uncon

# FreeRadius → Radius stats

Navigation

Config Analyzer

Views (Total: 32)

- Custom Views (Total: 0)
- Defaults (Total: 32)
- L2-3 Stats for Server Ports
- L2-3 Throughput Stats
- Port CPU Statistics
- Network (Total: 18)
- AAA-Radius Application
- AAA-Radius Application Errors
- AAA-Radius Application Rates - ...
- AAA-Radius General
- AAA-Radius Port
- AAA-Radius Port Rates - All Ports
- AAA-Radius Port Socket
- AAA-Radius Port Socket Rates - ...
- AAA-Radius Smart Events
- ANGW-Radius Application**
- ANGW-Radius Application Errors
- ANGW-Radius Application Rate...
- ANGW-Radius General
- ANGW-Radius Port
- ANGW-Radius Port Rates - All P...
- ANGW-Radius Port Socket
- ANGW-Radius Port Socket Rate...
- ANGW-Radius Smart Events

HTTP (Total: 11)

Custom (Total: 0)

ANGW-Radius Port

Stat Name	Messages Received	Messages Sent	Requests Received	Requests Sent	Responses Received	Responses Sent	Unsupported Messages Received	Response Authentication Failed	Malformed Messages Rece
1 192.168.61.155/Card01/Port01	500	500	0	500	500	0	0	0	

All ANGW-Radius Port

ANGW-Radius Application

Stat Name	Transaction Active	Access Request Messages Sent	Access Accept Messages Received	Accounting Request Messages Sent	Accounting Response Messages Received	Accounting Start Request Messages Se
1 192.168.61.155/Card01/Port01	0	300	100	200	200	

All ANGW-Radius Application

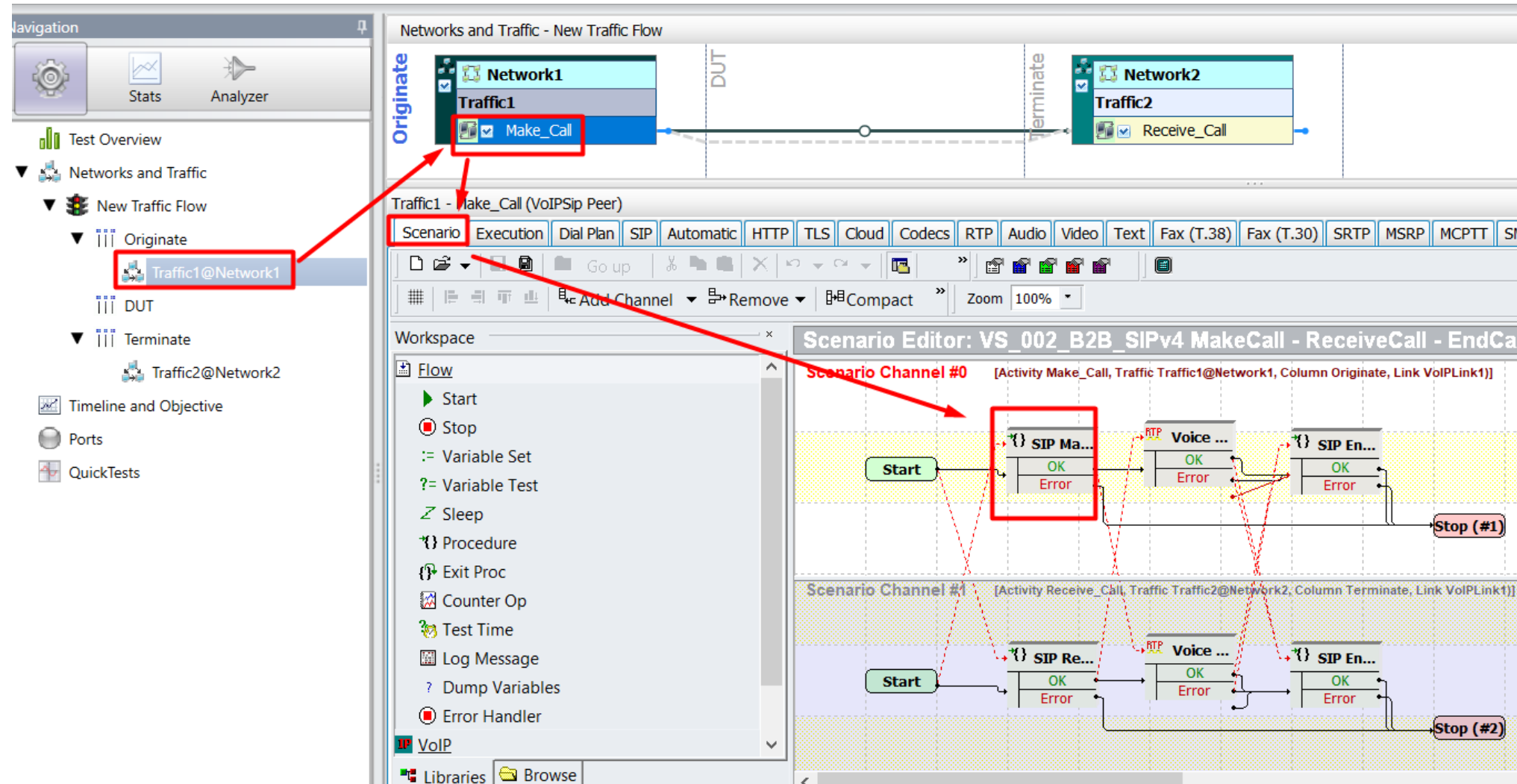
ANGW-Radius Application Errors

Stat Name	Transaction Failed	Transaction Reset	Unsupported Message Rcvd	Error Message Rcvd	Too Busy Errors Received	Unable to Deliver Rcvd	Redirect Indication Rcvd	Data Missing Errors Received	Invalid
1 192.168.61.155/Card01/Port01	0	0	0	0	0	0	0	0	

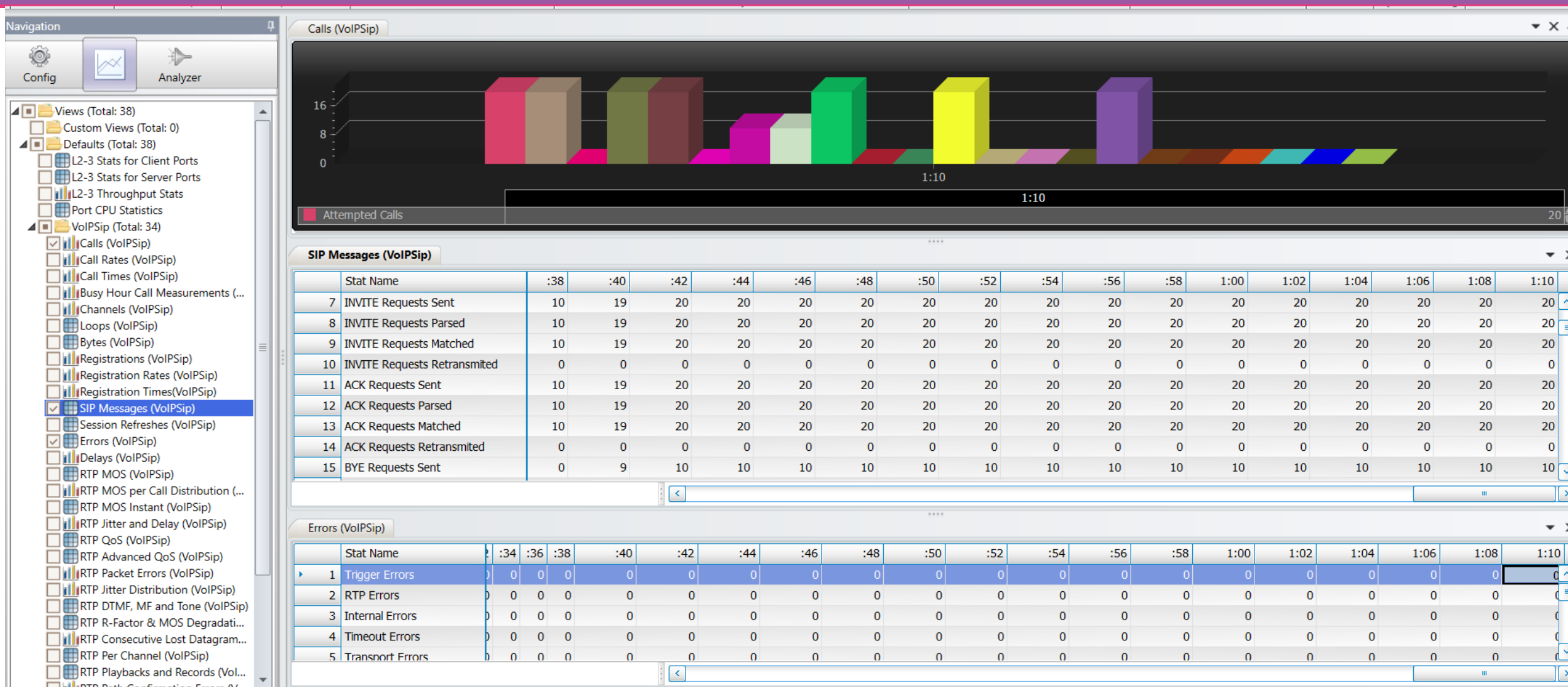
All ANGW-Radius Application Errors

# Asterisk → VoIP Configuration

How to check the configuration

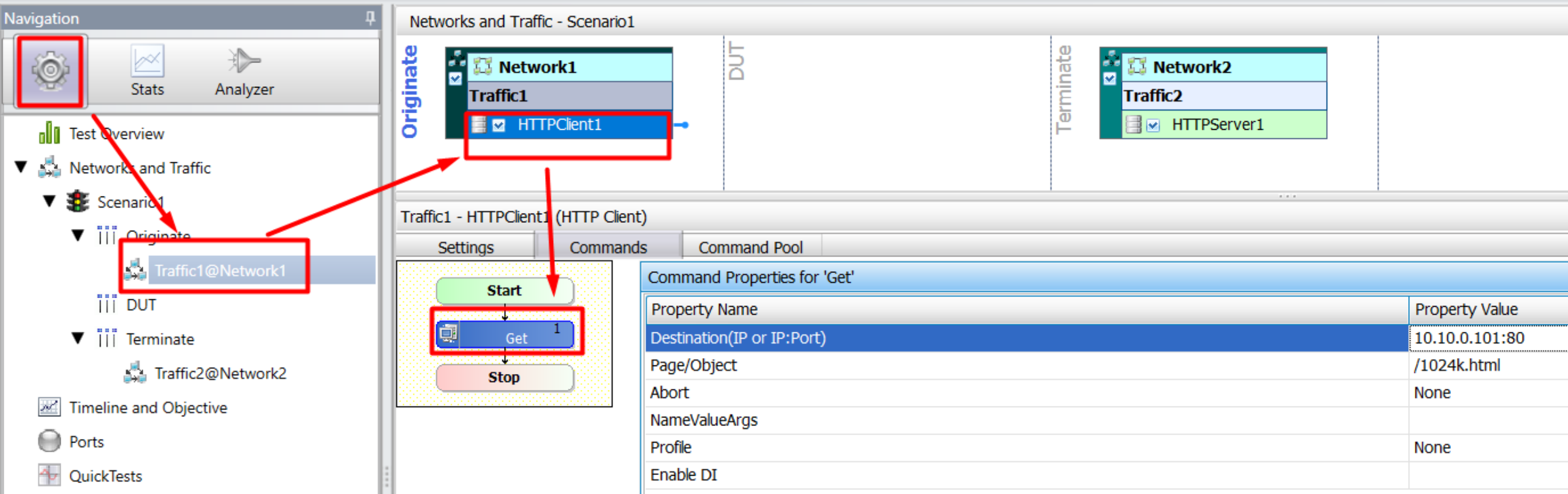


# Asterisk → VoIP stats



# VYOS → HTTP Configuration

How to check the configuration



The screenshot displays the Open Source MANO interface for configuring a scenario. The left sidebar shows the navigation tree with the following structure:

- Test Overview
- ▼ Networks and Traffic
  - ▼ Scenario1
    - ▼ Originate
      - Traffic1@Network1**
    - DUT
    - ▼ Terminate
      - Traffic2@Network2
- Timeline and Objective
- Ports
- QuickTests

The main area shows the configuration for "Networks and Traffic - Scenario1". It is divided into three sections: "Originate", "DUT", and "Terminate".

- Originate:** Contains "Network1" with "Traffic1". Under "Traffic1", "HTTPClient1" is selected and highlighted with a red box.
- DUT:** Empty.
- Terminate:** Contains "Network2" with "Traffic2". Under "Traffic2", "HTTPServer1" is selected.

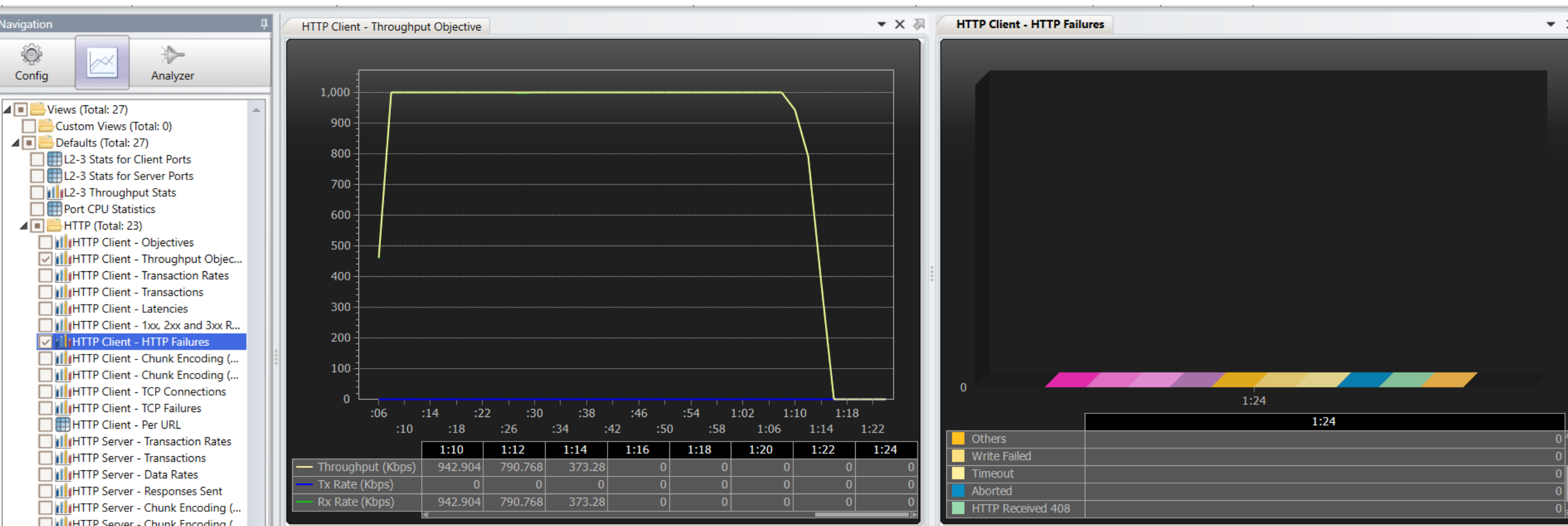
Below the "Originate" section, the configuration for "Traffic1 - HTTPClient1 (HTTP Client)" is shown. The "Commands" tab is active, displaying a flowchart:

```
graph TD; Start([Start]) --> Get[Get 1]; Get --> Stop([Stop]);
```

The "Get 1" command is highlighted with a red box. To the right, the "Command Properties for 'Get'" table is displayed:

Property Name	Property Value
Destination(IP or IP:Port)	10.10.0.101:80
Page/Object	/1024k.html
Abort	None
NameValueArgs	
Profile	None
Enable DI	

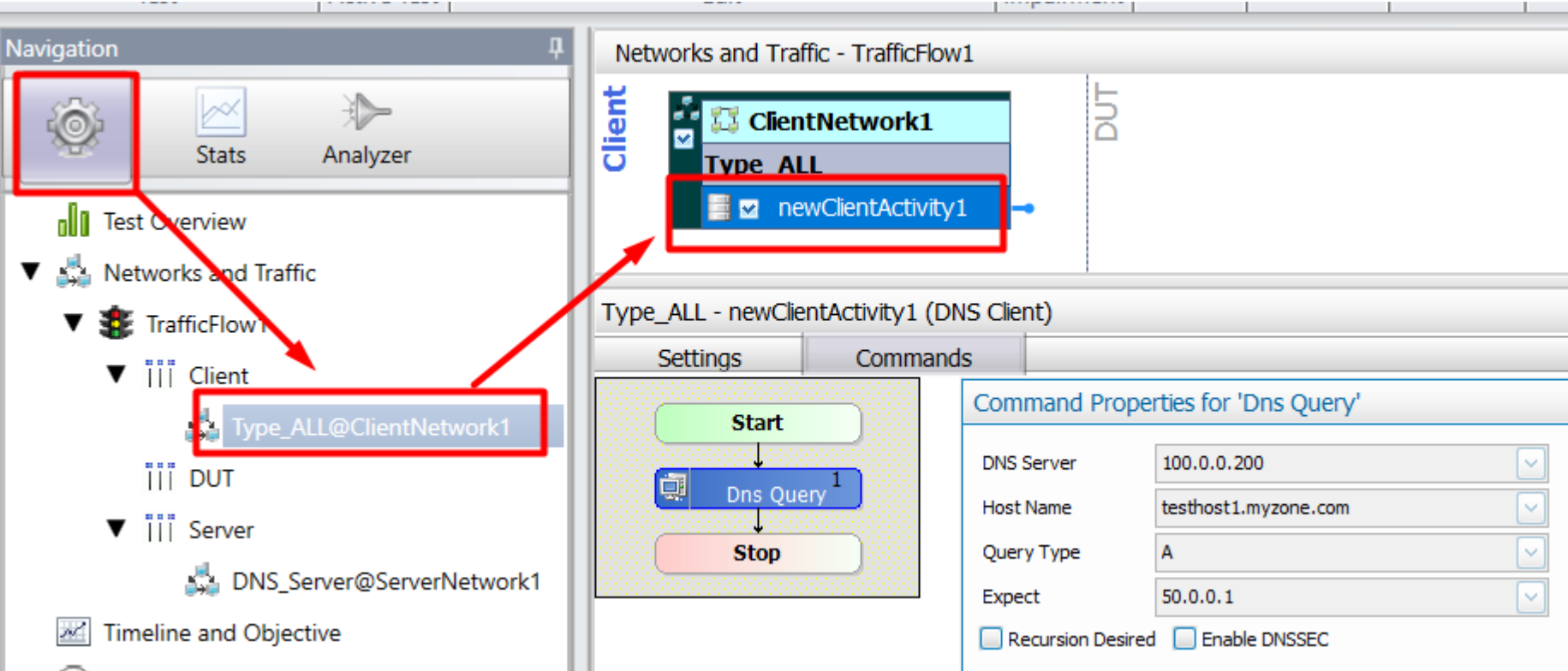
# VYOS → stats





# OpenDNS → DNS Configuration

How to check the configuration

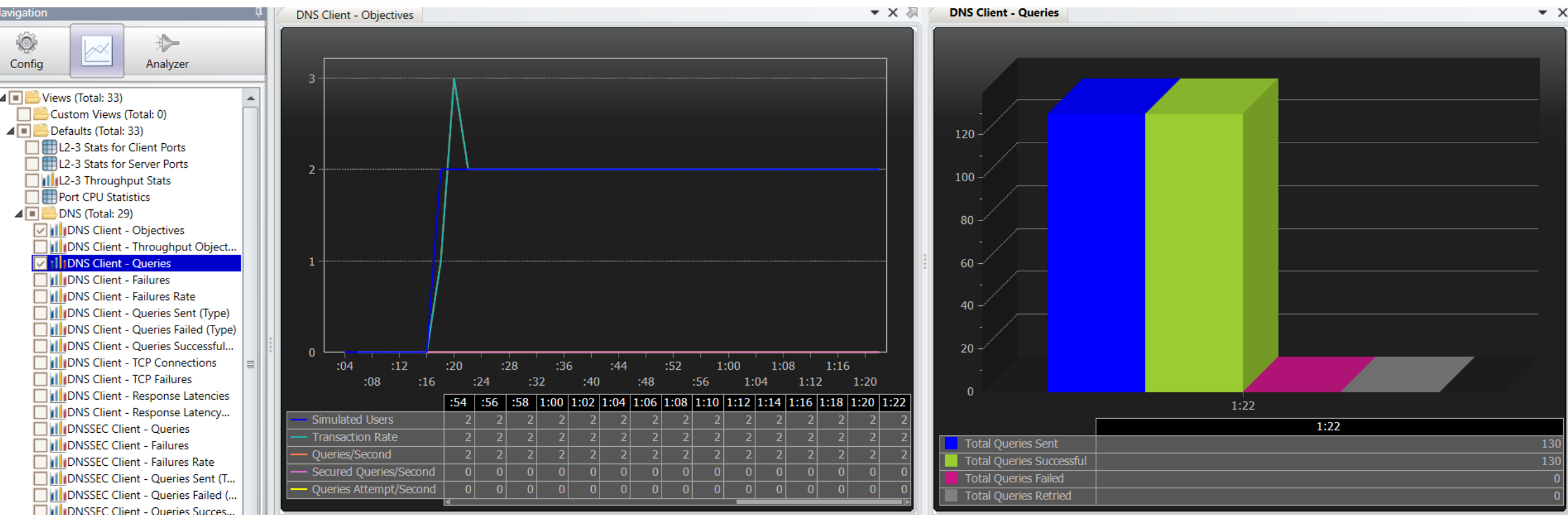


The screenshot displays the Open Source MANO interface with the following components:

- Navigation Panel (Left):**
  - A gear icon (Settings) is highlighted with a red box.
  - The tree view shows: Test Overview, Networks and Traffic (expanded), TrafficFlow1 (expanded), Client (expanded), and Type\_ALL@ClientNetwork1 (highlighted with a red box).
  - Other items in the tree include DUT and Server (containing DNS\_Server@ServerNetwork1).
  - Timeline and Objective is at the bottom.
- Main Panel (Right):**
  - Networks and Traffic - TrafficFlow1:** Shows ClientNetwork1 with Type ALL and newClientActivity1 (highlighted with a red box).
  - Type\_ALL - newClientActivity1 (DNS Client):**
    - Settings Tab:** Shows a flow diagram: Start → Dns Query<sup>1</sup> → Stop.
    - Commands Tab:** Shows Command Properties for 'Dns Query':

Property	Value
DNS Server	100.0.0.200
Host Name	testhost1.myzone.com
Query Type	A
Expect	50.0.0.1
Recursion Desired	<input type="checkbox"/>
Enable DNSSEC	<input type="checkbox"/>

# OpenDNS → DNS stats



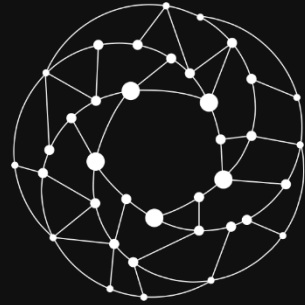


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Something is wrong  
with IxLoad?

Contact Keysight guys:

- Ruben Gutierrez
- Oliver Ferch



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**Happy Testing!!**  
Questions?