

# RTT and One-way Delay comparison scenario

This scenario provides a delay diagnostic of a deployed network. It is assumed that the network is stable. The diagnostic allows to sequentially assess different delay metrics (RTT and one-way delay)

## Objective

The purpose of this scenario is to compare delay results obtained from jobs: `fping`, `hping` (RTT) and `owping` (One-way Delay).

- `fping` measures the RTT delay (in ms) using the ICMP protocol (i.e. time since ICMP request sent until ICMP response received)
- `hping` measures the RTT delay (in ms) using the negotiation packets for opening a TCP connection (i.e. time since SYN sent until SYN-ACK received).
- `owping` measures the one-way delay (in ms) using OWAMP (One-way Active Measurement Protocol) detailed in [RFC 4656](#). OWAMP requires a client/server architecture. A server daemon is installed on the test host and a TCP control connection is opened between the two client/server machines. Then, client launches `owping` command which sends test UDP packets. There are two jobs to correctly execute `owping` test: `owamp-client` and `owamp-server`. `owamp-client` returns two statistics: **owd\_sent** (OWD from client to server) and **owd\_received** (OWD from server to client). This tool has been implemented by [perfSONAR](#).

`hping` and `fping` (which are persistent jobs) are launched during 60s. `owamp-client` is not a persistent job, it sends 100 test packets by default and after that the job instance stops. As it is shown in the following scenarios, `owamp-server` job must be launched before `owamp-client` with a guard period to let enough time to the server to be switched on. This guard time depends on the current delay of the network of interest. In this scenario example, the guard time has been set to 5s.

## Methodology

Two approaches are used to analyse the delay:

- The first one considers a parallel/simultaneous launch of the three jobs.
- The second one considers a sequential launch of the three jobs in order to avoid any overload caused by the injected test packets (active measurement methods).

The scenario proposed herein will then:

- Launch subscenarios `delay_simultaneous` or `delay_sequential` as subscenarios (allowing to compare the RTT measurement of `fping`, `hping` and `owamp` jobs).
- Launch two postprocessing jobs to compare the time-series and the CDF of the delay measurements.

These scenarios have been written using the [scenario builder](#).

## How to launch it

The scenario is available in [network\\_delay](#) . It uses helpers (see [API scenario manual](#) for more information on helpers), and subscenarios `delay_sequential` and `delay_simultaneous`.

You must already have a project (i.e. “your\_project”), two entities in the project (a server and a client), the `hping/fping/owamp-client` jobs installed in the client and the `owamp-server` job installed in the server. You also need to install `histogram` and `time-series` jobs on the “your\_entity”.

The reference scenario script [generate\\_network\\_delay](#) will allow to launch it as follows.

```
python3 generate_network_delay.py -o -p your_project --client your_client_entity --server your_server_entity --ip_dst @IP --entity_pp your_entity run
```

By default, it launches the scenario with the simultaneous methodology. If you want to launch the sequential one, you should add “- -sequential” to your arguments.

Alternatively, it can create a JSON file that could be imported to the OpenBACH web interface:

```
python3 generate_network_delay.py -o -p your_project --client your_client_entity --server your_server_entity --ip_dst @IP --entity_pp your_entity build .
```

An example of the type of results that this scenarios is capable of plotting is shown below:



The plots can be downloaded from the OpenBACH web interface: go to the scenario instance, click on export CSV, check the histogram and time-series boxes and click on Download.

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