

# User manual: FDTAgent for DYNES

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The data flow architecture for the [Dynamic Network Services \(DYNES\) cyber-instrument](#) is described in the following document: “[DYNES: End-to-End Data Flow Architecture \(pdf\)](#)”.

## Installation requirements

FDTAgent software requires **Java version 6 or higher**. It was tested and it is working with both OpenJDK distributions, usually available in any Linux distribution, or the official Sun/Oracle version available from: <http://java.com/>. The software was tested and works on RHEL and RHEL-based distributions like CentOS and Scientific Linux, versions 5.x and 6.x, as well as Debian, version 5.x and 6.x, and Debian-based distributions like Ubuntu (from 10.04 up to 12.04). Java version 7.x is the recommended version and is available on Oracle web site.

Linux Advanced Routing & Traffic Control, also known as the **iproute package** is required. FDTAgent uses **/sbin/ip** command to modify the local routing table in order to enforce the data flows over the data interfaces.

The VLAN (802.1q) configuration program, `/sbin/vconfig` must be installed on the system. It is available on all Linux distributions usually as **vconfig package**. FDTAgent uses it to configure the VLAN sub-interfaces once the DYNES circuit is created.

## Starting FDTAgent

By default, the FDTAgent software is installed on the FDT server under `/home/dynes/FDTAgent` and runs under "dynes" account.

Before starting the agent verify that "dynes" user has ``sudo`` access to be able to configure the FDT system VLANs and modify the local routing table. Due to the fact that the agent runs as a daemon the **requiretty** must be commented in your `/etc/sudoers` file. As root use ``visudo`` command and comment the following line:

```
# Defaults    requiretty
```

The script to check and start/stop the FDTAgent and is installed under:

```
/home/dynes/FDTAgent/sbin/fdtagentctl
```

To start the agent:

```
$/home/dynes/FDTAgent/sbin/fdtagentctl start
```

To stop the agent:

```
$/home/dynes/FDTAgent/sbin/fdtagentctl stop
```

Check if the agent is running. The will print the process ID (PID) if the agent is started.

```
$/home/dynes/FDTAgent/sbin/fdtagentctl status
```

## Using FDTAgent for data transfers over DYNES circuits

The FDTAgent can be control using a local script, which is installed under `bin` directory:

```
/home/dynes/FDTAgent/bin/dynesfdt
```

## List available agents (list subcommand)

```
[~/FDTAgent/bin]$ ./dynesfdt list
```

The command will list all available end-sites within the DYNES cyber-instrument. Data transfers can be initiated to and from these sites. The output contains the number of sites, the site name agreed within DYNES environment. The short name for the site is used to transfer data to and from the other sites.

## Data transfer from/to a remote site (fdt subcommand)

The same `dynesfdt` script is used for data transfers. The syntax to transfer data **FROM** a remote site is:

```
[~/FDTAgent/bin]$ ./dynesfdt fdt remoteSite:/remoteDir /localDir
```

The `remoteSite` can be any of the sites from the "list" command described [above](#). The IP addresses for the data plane will be negotiated between the remote sites. The FDTAgent will request a circuit with the remote site to the local IDC. Once the status of the reservation becomes AVAILABLE the local networking stack (VLANs, IP addresses and routing table) is modified to enforce the data flow over the established circuit. As soon as everything is agreed between the agents the connectivity over the circuits is tested with a few ICMP ("ping") packets. After that the data flow is started.

All the files in the `remoteDir` will be transferred to the `localDir`.

To transfer data **TO** a remote site a similar syntax is used:

```
[~/FDTAgent/bin]$ ./dynesfdt fdt /localDir remoteSite:/remoteDir
```

The same steps, described above, are performed.

**Note:** Test the performance of the circuit memory to memory transfers (`/dev/zero` to `/dev/null`)

```
[~/FDTAgent/bin]$ ./dynesfdt fdt /dev/zero remoteSite:/dev/null
```

And in the reverse direction:

```
[~/FDTAgent/bin]$ ./dynesfdt fdt remoteSite:/dev/zero /dev/null
```

## Data transfer options

The data transfer commands described [above](#) support parameters which allows specifying the bandwidth and number of streams for FDT. By default, 100Mbps circuits are used and four TCP streams. The additional parameters are specified right after "fdt" subcommand using:

```
-co <options> parameter
```

E.g: For a memory to memory transfer over a 4Gbps circuit and uses 128 streams with Caltech, the command will be (please note that the bandwidth is specified in Mbps):

```
[~/FDTAgent/bin] ./dynesfdt fdt \  
-co bandwidth=4000,ntcpstreams=128 \  
/dev/zero caltech:/dev/null
```

At any given moment the command is terminated using **Ctrl+C** in the interactive mode, or **kill PID**, where PID is the process ID of the dynesfdt script, in the non-interactive mode.

**Important:** Once the procedure is triggered a few moments are needed to cancel your circuit reservation. The command will exit in the shell as soon as the IDC reports the reservation as CANCELED.

## Circuit reservation to a remote site (ping subcommand)

The same dynesfdt script is used to make only circuit reservation to a DYNES site, using "ping" subcommand instead of "fdt". The command can be ended using the same procedure: either **Ctrl+C** in the interactive mode, or **kill PID**, where PID is the process ID of the dynesfdt script, in the non-interactive mode.

```
[~/FDTAgent/bin]$ ./dynesfdt ping remoteSite
```

The same [Data transfer options](#) are valid for the "ping" subcommand also.

E.g. To reserve a 4Gbps circuit to Caltech:

```
[~/FDTAgent/bin]$ ./dynesfdt ping -co bandwidth=4000 caltech
```

## Other resources:

DYNES web site: <http://www.internet2.edu/dynes>

FDT website: <http://fdt.cern.ch>

OSCARS 0.6 API: <http://code.google.com/p/oscars-ipc/wiki/OSCARS06Protocol>

OSCARS 0.5 API: <http://www.controlplane.net>