SiteShadow

User Reference Guide

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1. SiteShadow Overview

The JVN SiteShadow tool executes and manages applications that are needed to sniff live Interfacility and surveillance connections while forwarding messages to a "shadowing" system. The applications necessary for this functionality are IFShadow, relayd, and avid.

IFShadow – interfacility messages

relayd – surveillance data

avid – graphical display of relayd message counts

2. Getting Started

The processor with SiteShadow installed is configured to boot to a user login screen. Users can enter a username and password, then click the login button or press **ENTER** on the keyboard.
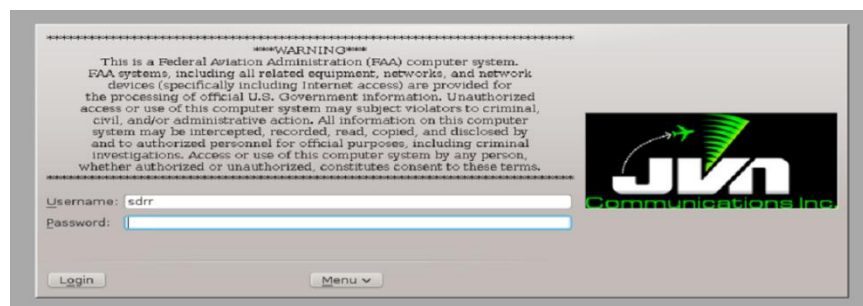
Figure 1. SiteShadow Processor Login

After a short loading period the KDE desktop will appear.

Figure 2. SiteShadow Processor Desktop

2.1. Environment Variables

SiteShadow uses several environment variables that set the locations of configuration files and recordings.

Table 1. Environment Variables

Variable Name	Description	Default Location
`SDRR_CONFIG_PATH`	Location of SDRR configuration files.	/usr/local/cfg
`RECORD_PATH`	Location of recording files.	/usr/local/recordings

2.2. SiteShadow Parameters

SiteShadow can be started with optional parameters which control its operation.

Table 2. Program Parameters

Parameter	Description
`<srcCfgFile.xml>`	The source configuration file that tells SiteShadow where to receive the data from.
`<labCfgFile.xml>`	The lab configuration file that tells SiteShadow which devices to use.
`--offset=<time offset value>`	The amount of time to hold the data before sending it. The value is 100ths of a second and the default is to send the data immediately.
`--IFShadow=<host,stars>`	Starts IFShadow; with "host" as the 3 letter identifier of the HOST system in the config file and "stars" as the 3 letter identifier of the system that is being connected to.
`--IFShadowPlayback=<filename>`	Creates an SDRR playback file. By default if no filename is specified /tmp/playback.xml.MMDDYYYY.hhmm will be created.
`--enablehandoffs`	Enables handoffs from HOST to STARS on start up. By default handoffs are disabled.
`--disablefield48`	Disables field 48 in the accept transfer (TA) message.
`--avid`	Starts AViD to display a graphical count of surveillance statistics.
`--nodatadist`	Do not start datadist process.
`--sdrr=<sdrrCfg.xml>`	Starts SDRR using the configuration file specified. Can be used for ETMS, static ADS-B message generation, etc.

Parameter	Description
`--nofullscreen`	Will not open SiteShadow to the full size of the screen.
`--native`	Specifies the native graphics engine.
`--raster`	Specifies the raster graphics engine.
`--single`	Will cause SiteShadow to exit if an instance of SiteShadow is already running.
`--deviceFile=deviceFile`	File that defines devices used in variable configurations.

2.3. Starting SiteShadow

2.3.1. Starting from the Command Line

SiteShadow can be started by typing siteshadow and various options at the command line in a terminal window:

```
> siteshadow /usr/local/cfg/src.xml /usr/local/cfg/lab.xml --IFShadow=zfw,dfa –avid
--sdrr=/usr/local/cfg/sdrrCfg.xml
```

2.3.2. Starting the SiteShadow Wizard

The SiteShadow wizard can be started by entering **SiteShadow** at the command line. The options that are listed above can be selected through the wizard's GUI. The "Source Configuration" and the "Lab Configuration" are required inputs. Once they are selected, the "Finish" button becomes enabled.
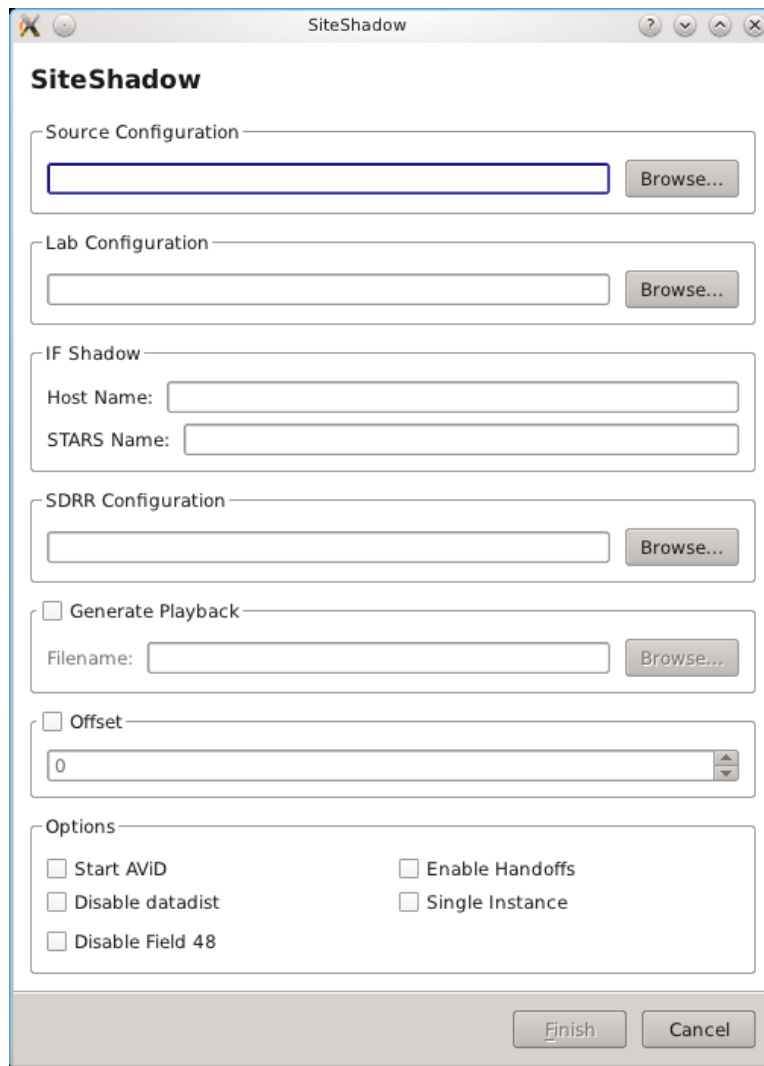

Figure 3. SiteShadow Wizard

2.4. SiteShadow Configuration Files

Examples of the srcCfgFile and labCfgFile configurations files are included below.

2.4.1. Example srcCfgFile

```
<root>
   <sources>
      <radar  name="atl" device="multi:eth1:239.1.1.1/1900" type="asr9-modes" magdev="-
3.00" scantime="4.75" elev="1028.00" pos="+33:37:43.50,-084:25:48.20"/>
      <arts name="aaa" device="multi:eth1:239.1.1.1/1909" facName="aaa" autoTR="0"/>
      <host name="ztl" facName="zct" facID="t" autoTR="0" autoTA="10"
tangent="+34:21:24.98,-084:02:28.97" org="-424.000,-365.625">
         <artsio name="aaa" device="multi:eth1:239.1.1.1/1910" facName="aaa" magdev="-3.00"
tangent="+33:37:44.00,-084:25:48.00"/>
      </host>
   </sources>
</root>
```

2.4.2. Example labCfgFile

```
<root>
   <sources>
      <radar name="atl" device="/dev/srr0" type="asr9-modes" magdev="-3.00" scantime="4.75"
elev="1028.00" pos="+33:37:43.50,-084:25:48.20"/>
      <host name="ztl" facName="zct" facID="t" autoTR="0" autoTA="10"
tangent="+34:21:24.98,-084:02:28.97" org="-424.000,-365.625">
         <artsio name="aaa" device="/dev/if0" facName="aaa" magdev="-3.00"
tangent="+33:37:44.00,-084:25:48.00"/>
      </host>
   </sources>
</root>
```

In the above configuration files the shadow data comes in on the network device eth1 and is then sent out to a locally connected system by devices on the SiteShadow machine /dev/srr0 and /dev/if0. This is just a simple example showing radar and interfacility messages being shadowed. More complex configurations can be made to shadow radar, interfacility, ADS-B and DASI data to the system.

3. IFShadow

The JVN IFShadow application safely sniffs live IFDT connections with a receive port while passing the IFDT data along a separate bidirectional port to a terminal system/s, (STARS, CARTS, TAMR, etc.). IFShadow acts as a translator between what it receives from the live IFDT and what it sends to the terminal system/s, converting ECID and TCIDs to match the connected terminal system/s. The terminal system/s actually receives what the real HOST sends and is able to respond back with DA, DR because IFShadow is in the middle acting like a smart switch. This allows controller/trainees to actually have real flight plans populate their tab list and auto acquire on tracks.
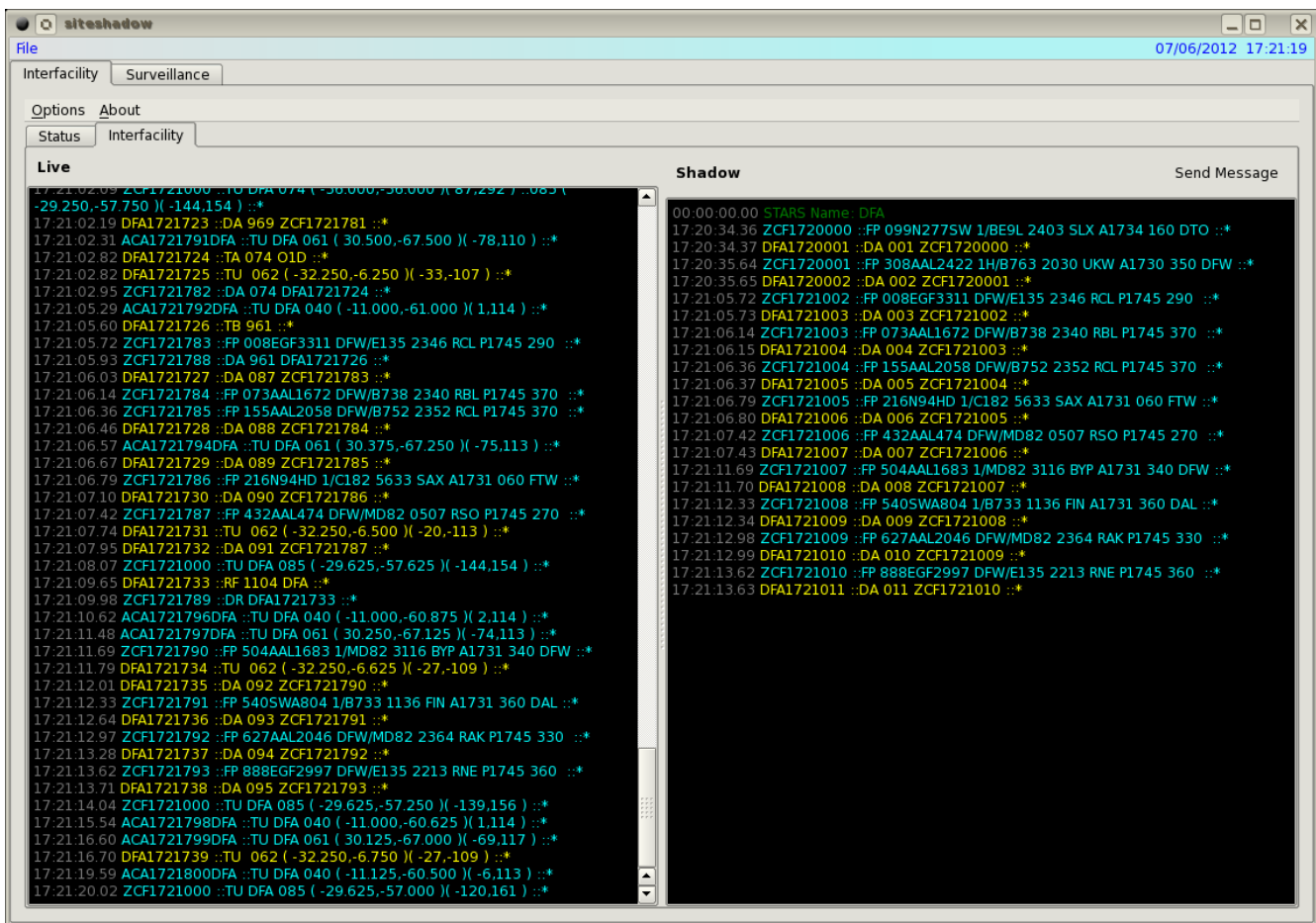
Figure 4. Interfacility Tab

3.1. IFShadow Options

IFShadow includes the ability to pass handoff messages to and from the Host/Terminal. This allows controller/trainees to receive the actual arrival/over-flight handoffs from the center. To enable this functionality select "Enable Incoming Handoffs" from the options menu. They are also able to handoff departures tracks to the simulated center, or even to adjacent facilities that IFShadow is simulating. The controller will be able to see the response DA/DR messages as if the real HOST/Terminal responded. This is a big help while testing handoffs to adjacent sites.

IFShadow includes the ability to enable field 48 in the TA message. By default this option is enabled to include filed 48. Some sites are configured to not receive filed 48 so disabling this will allow the site to mimic the TA message that they would receive. This option can be toggled while running by selecting "enable filed 48" from the options menu or disabled during application startup with the command line option "--disablefield48". See the image below for the options menu.
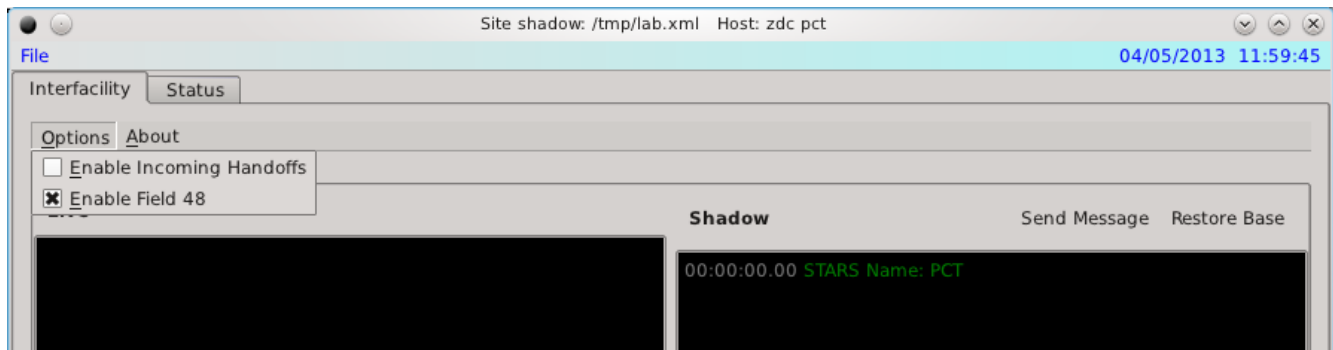
Figure 5. IFShadow Options

3.2. Send Message

IFShadow includes a helpful send message button to allow messages to be input real-time such as flight plans, amendments, etc. to their terminal system. This functionality has proven to be a valuable test feature while debugging IFDT issues. It also allows users to manually send flight plans to tag with targets of opportunity on the glass.
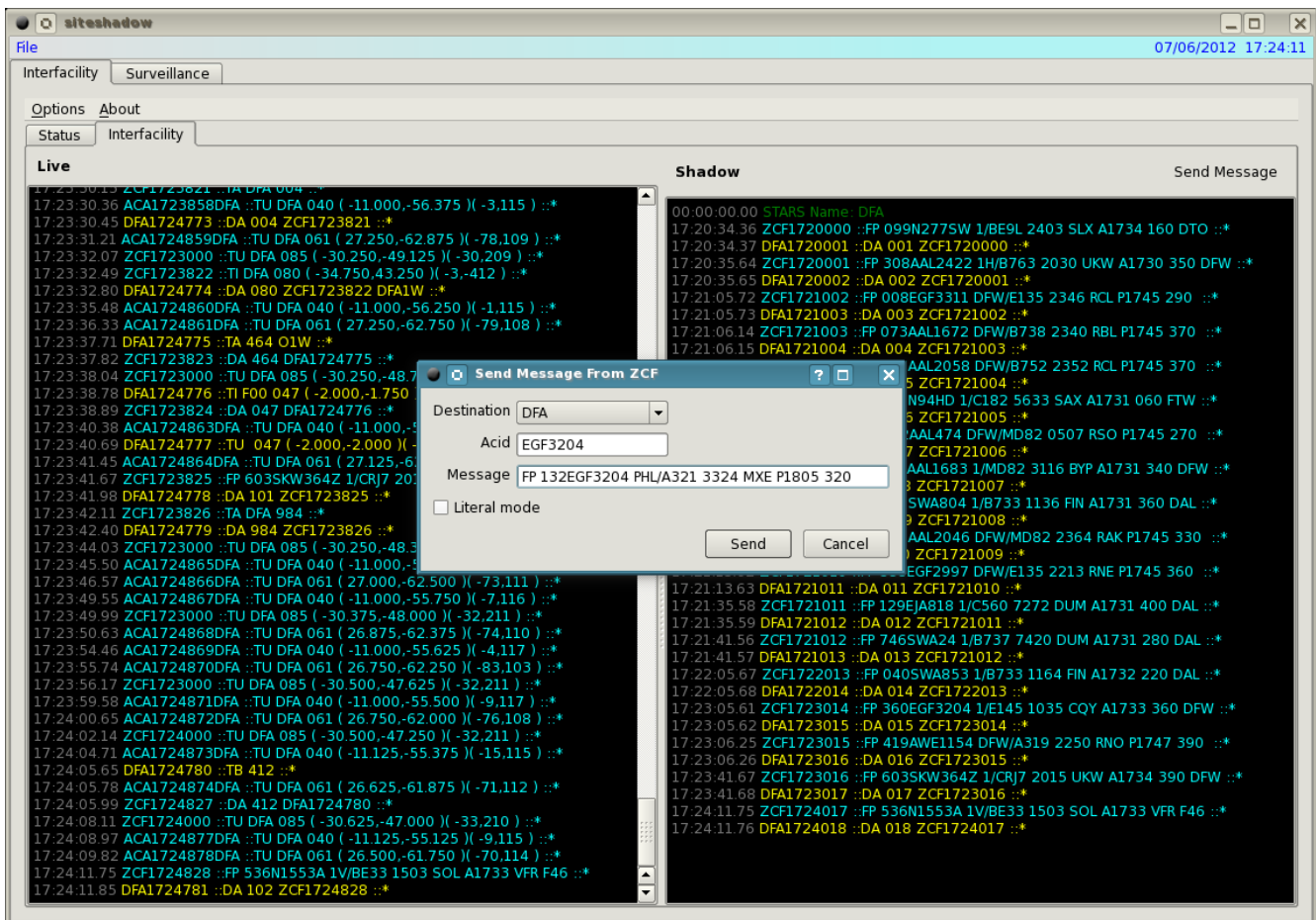

Figure 6. IFShadow Send Message Dialog

3.3. Restore Base

The Restore Base button under the interfacility tab is used to resend all of the active Flight Plans that are in the system. This is useful to use after doing a cold start or reset of the automation system.
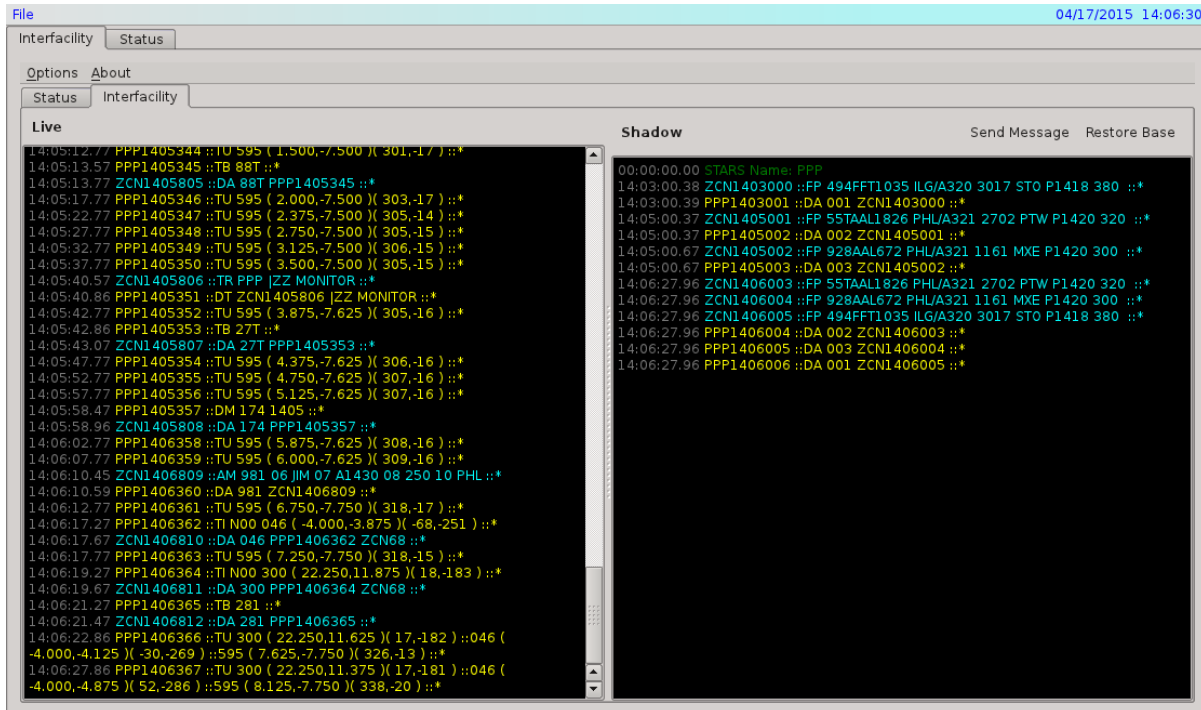
Figure 7. IFShadow Restore Base Function

4. Relayd

This application is a process that relays JVN formatted messages. JVN formatted messages can be serial radar data, ADS-B data, Interfacilty messages or DASI. The devices used for input and output are defined in configuration files.

```
Usage : relayd inputCfg [outputCfg | -a dir] [-dtq]
        -a dir Auto-create output files in specified dir.  dir will be created if needed.
        -d Turn debug messages on.
        -q don't use QCoreApplication eventLoop (do select ourselves).
        -t Don't fork into background.
```

4.1. Relayd Configuration Files

Below are examples of the inputCfg and outputCfg configuration files.

4.1.1. Example inputCfg

```
<root>
    <sources>
        <radar name="atl" device="/dev/srr0" type="asr9-modes" magdev="-3.00" scantime="4.75"
elev="1028.00" pos="+33:37:43.50,-084:25:48.20"/>
        <arts name="aaa" device="/dev/if1" facName="aaa" autoTR="0"/>
        <host name="ztl" facName="zct" facID="t" autoTR="0" autoTA="10"
tangent="+34:21:24.98,-084:02:28.97" org="-424.000,-365.625">
            <artsio name="aaa" device="/dev/if2" facName="aaa" magdev="-3.00"
tangent="+33:37:44.00,-084:25:48.00"/>
        </host>
    </sources>
</root>
```

4.1.2. Example outputCfg

```
<root>
    <sources>
        <radar  name="atl" device="multi:eth1:239.1.1.1/1900" type="asr9-modes" magdev="-
3.00" scantime="4.75" elev="1028.00" pos="+33:37:43.50,-084:25:48.20"/>
        <arts name="aaa" device="multi:eth1:239.1.1.1/1909" facName="aaa" autoTR="0"/>
        <host name="ztl" facName="zct" facID="t" autoTR="0" autoTA="10"
tangent="+34:21:24.98,-084:02:28.97" org="-424.000,-365.625">
            <artsio name="aaa" device="multi:eth1:239.1.1.1/1910" facName="aaa" magdev="-3.00"
tangent="+33:37:44.00,-084:25:48.00"/>
        </host>
    </sources>
</root>
```

Using relayd with these configurations will cause any data from srr0/if1/if2 to be sent out of the network device eth1.

4.2. Manage relayd

Manage relayd is a convenient way to start, stop, restart or check the status of relayd. This is performed through the K-menu or the main panel. Left clicking on the K-menu you will find a section called "**Manage relayd**". Within the submenu there are four options **Restart/Start/Status/Stop** clicking on one of these will perform that action. If setup in the main panel left clicking on the icon will pop up a similar menu. After clicking on one of the options a window will be displayed with feedback from the action performed.
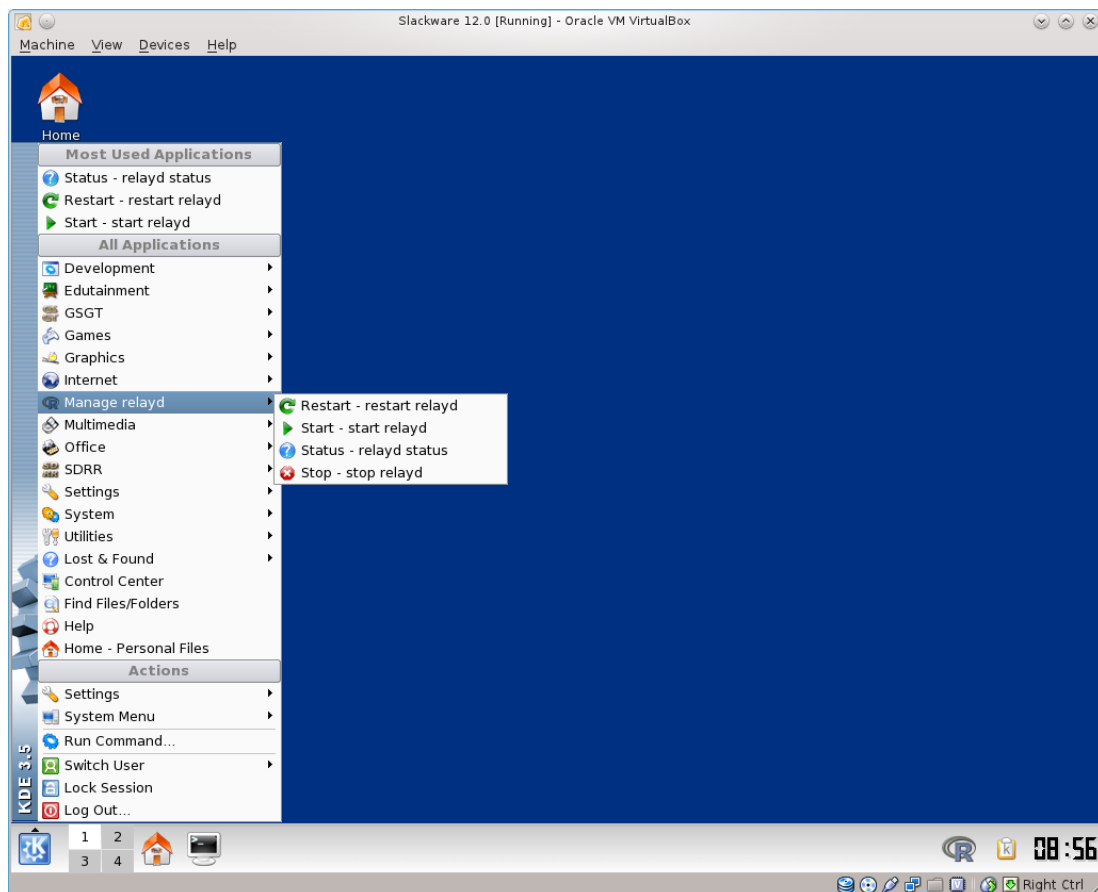
Figure 8. Manage relayd Through the K-Menu
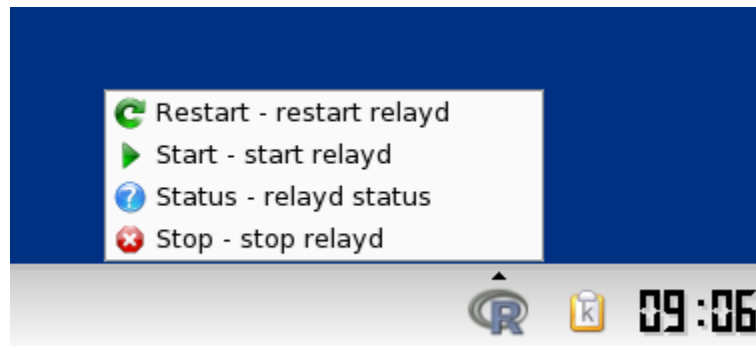
Figure 9. Manage relayd Through the Main Panel

Figure 10. Manage relayd Status Feedback

5. AViD

The Airspace Visualization Display (AViD) displays a graphical representation of messages counts from the relayd process.
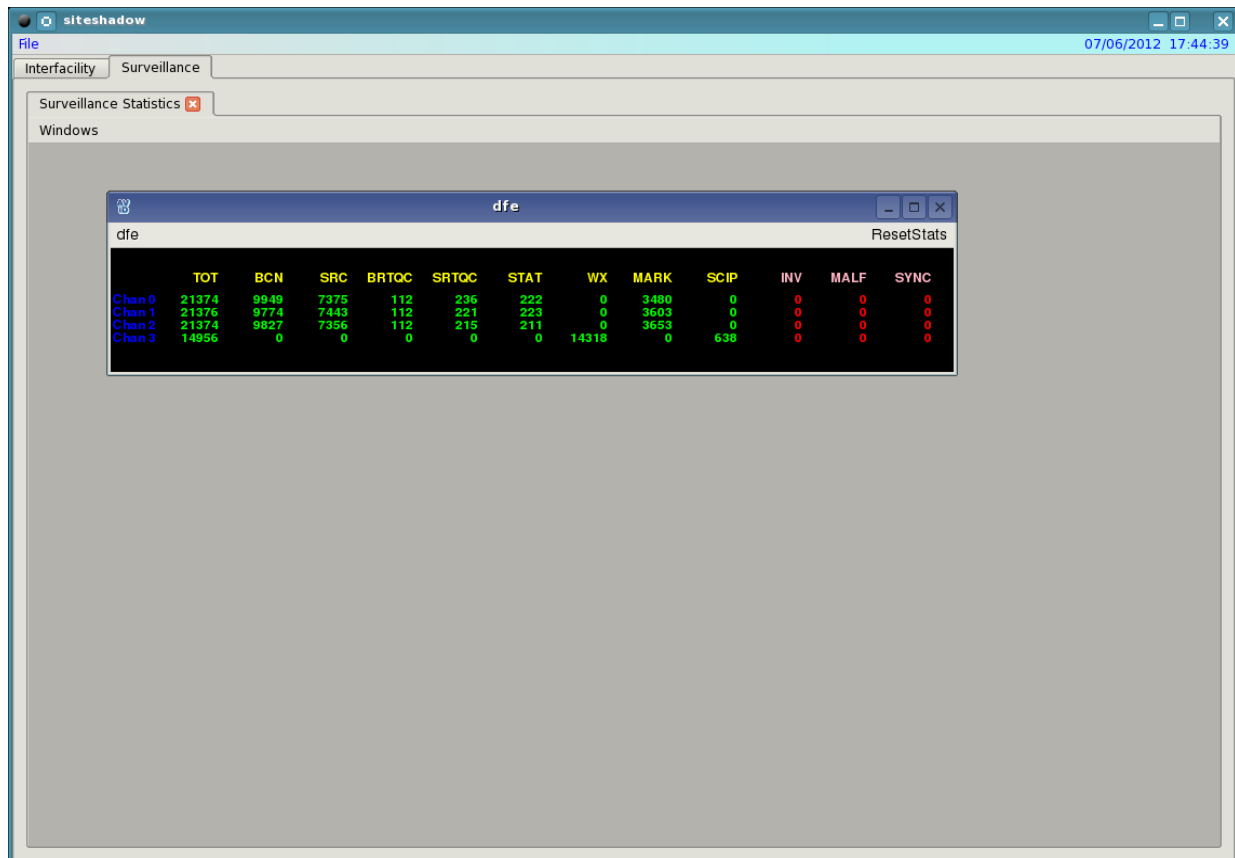
Figure 11. AViD Surveillance Tab

6. SDRR

SiteShadow can also include the use of SDRR to simulate ETMS or DASI data interfaces. When the --sdrr option is used an SDRR tab will appear in SiteShadow. Clicking the SDRR Tab will allow the user to display ETMS or DASI interaction with the system.
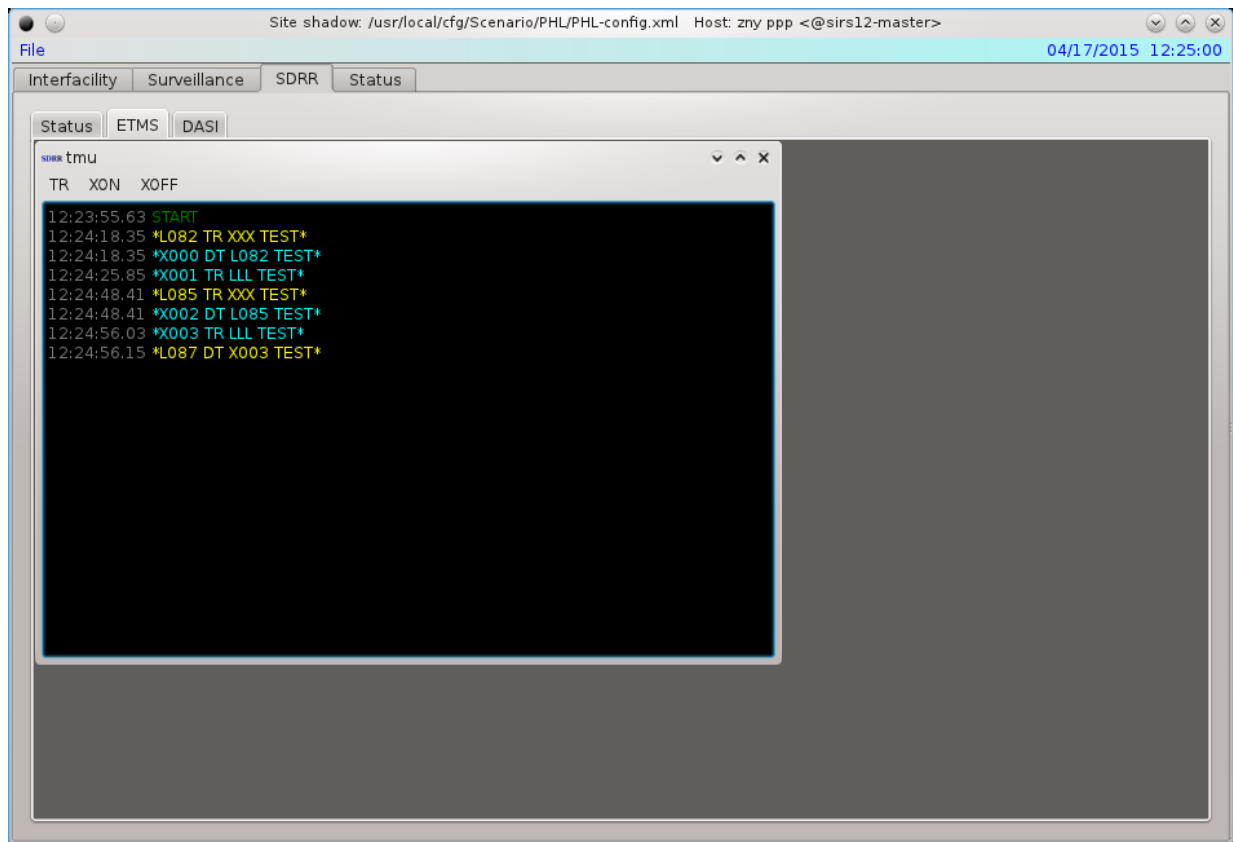
Figure 12. ETMS Simulation Data Under the SDRR Tab

Under the DASI tab the user can adjust the Update Period or the DASI value that is sent to the system.
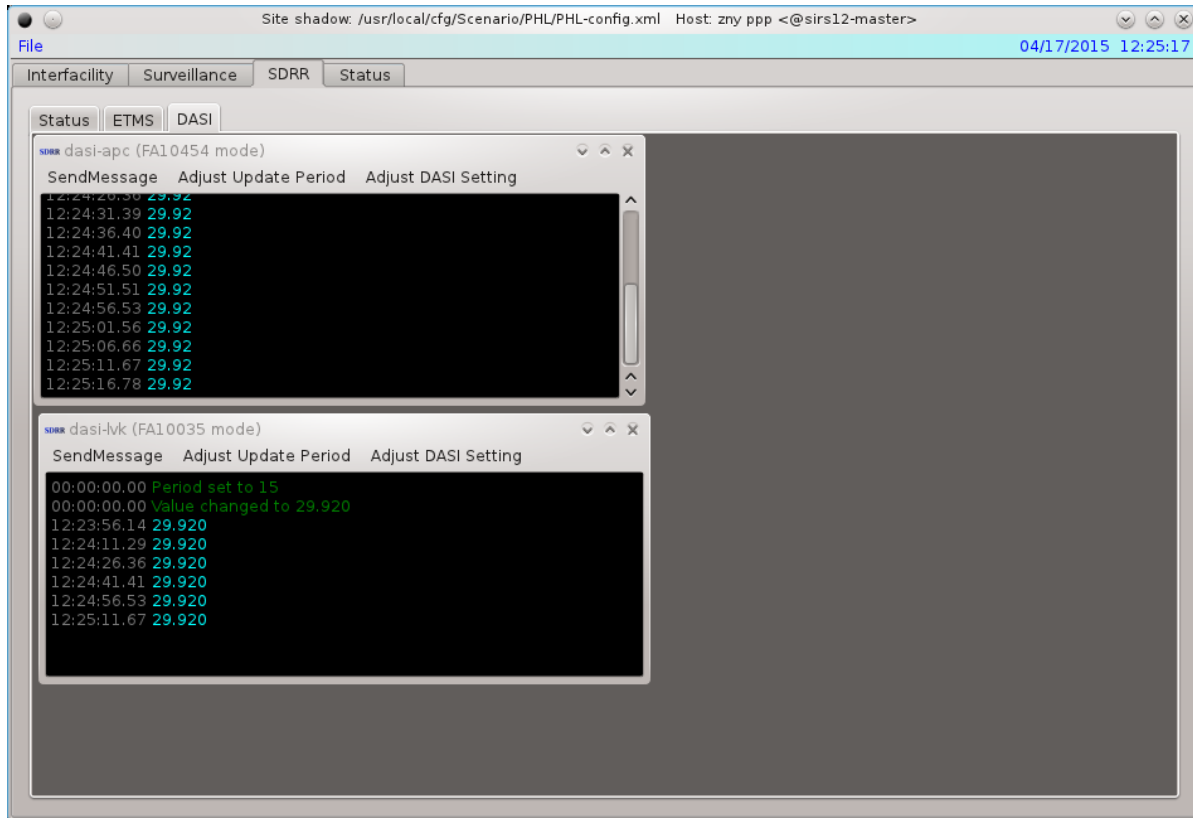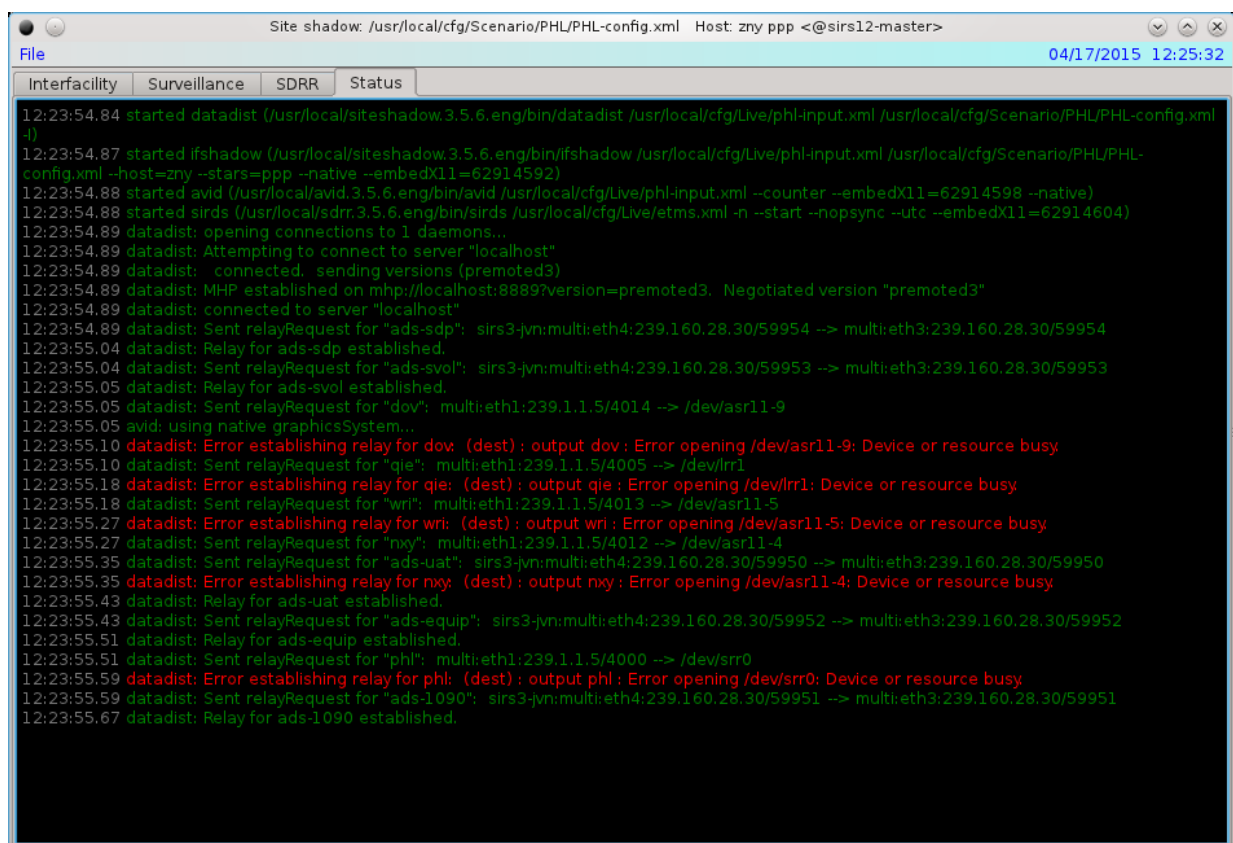
Figure 13. DASI Simulation Under the SDRR Tab

7. Status Tab

The Status Tab in SiteShadow displays useful information about the system status and device connections. Red errors may be displayed in the tab alerting the user to potential problems with the configuration. Some errors that the user may be alerted to are the the "Device or resource is busy" which means that the radar device is already transmitting data. The user should check that no other scenarios are running using the devices.

Figure 14. Status Tab

Appendix A. Acronyms

ADS-B	Automatic Dependent Surveillance – Broadcast
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AViD	Airspace Visualization Display
CAS	Commercially Available Software
CD2	Common Digitizer
DASR	Digital Surveillance Radar
DYSIM	Dynamic Simulation
ECGP	External Communications Gateway Protocol
ERAM	En Route Automation Modernization
FAA	Federal Aviation Administration
GSGT	Graphic Simulation Generation Tool
GUI	Graphical User Interface
IFDT	Interfacility Data Transfer
MLAT	Multilateration
NAS	National Air Space
RAPPI	Random Access Plan Position Indicator
RSI	Record Select Indicator
SDRR	Simulation Driver Radar Recorder
SSRV	Simulation Services
STARS	Standard Terminal Automation Replacement System
SWIM	System-Wide Information Management
TARP	Time based Archive Recording Player
TRACON	Terminal Radar Approach Control
WAM	Wide Area Multilateration
WJHTC	William J. Hughes Technical Center