DCN Software Suite v0.3:

DRAGON Installation Guide

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1 Overview

1.1 About this Document

This document is intended to be a guide for installing the DRAGON software. This software is part of the DCN Software Suite and is utilized as the Domain Controller (DC) for the Internet2 Dynamic Circuit Network (DCN). Instructions for installation of the I2 DCN Inter-Domain Controller (IDC) and the associated configuration to allow it to interact with the DRAGON software can be found here in the DCN Software Suite v0.3: OSCARS Inter-Domain Controller (IDC) Installation Guide.

The DRAGON software enables the dynamic control of multiple dataplane technologies. This includes various Ethernet switches, Ciena Core Directors, or a topology which includes a mix of both.

The document assumes basic familiarity and experience with a Unix-like operating system.

1.2 DRAGON Components

The DRAGON software consists of the following major components:

- VLSR (Virtual Label Switch Router) - This control plane component includes the OSPF-TE, RSVP-TE, and user interface for initiating provisioning actions. The VLSR can be configured to be responsible for one or more network elements, which in the DCN deployment are the Ciena Core Directors. VLSR based dynamic provisioning across Core Director topologies is based on mapping Ethernet edge ports to variable capacity SONET circuits. The VLSR can also be utilized to control various types of Ethernet switches to construct dynamic circuits via automated VLAN based configurations.

- NARB (Network Aware Resource Broker)/RCE (Resource Computation Engine) - This control plane component includes the multi-domain, multi-level Path Computation Element (PCE) and Inter-Domain routing capabilities.

- DRAGONMon (DRAGON Monitor) - This control plane element monitors the status of existing LSPs (Label Switch Paths) and stores in a MySQL database for access by other systems. A web based display of current provisioned circuits is also included. DRAGONMon software is not included in the current distribution. It will be included as part of the next release.

1.3 Downloading the DRAGON Software

The DRAGON software is distributed as part of the DCN Software Suite. It can be downloaded at:

- https://wiki.internet2.edu/confluence/display/DCNSS

After downloading the DCN software suite, you may unpack it with the following commands:

```
% gunzip dcn-software-suite-0.3.tar.gz
% tar -xvf dcn-software-suite-0.3.tar
```

This will create a directory called `dcn-software-suite-0.3`. The DRAGON software is located in the subdirectory `dcn-software-suite-0.3/dragon`.

Inside the dcn-software-suite-0.3/dragon subdirectory, the following files and subdirectory will be found:

dragon-sw-snapshot.2008Apr29.tar.gz – This file contains the VLSR Software.

narb-sw-snapshot.2008Apr29.tar.gz – This file contains the NARB/RCE software.

docs – this folder contains this document

2   Installation and Configuration of the DRAGON Software

This section details how to install and configure DRAGON software. There are three steps in this process:

-Install and configure VLSR

-Install and configure NARB/RCE

-Install and configure DRAGONMon

2.1   VLSR Installation and Configuration

To install the DRAGON VLSR software issue the following commands:

1) cd dcn-software-suite-0.3/dragon

2) tar –xvf dragon-sw-snapshot.2008Apr29.tar.gz

3) cd dragon-sw/docs

4) Located in the above directory will be a file, dragon-vlsr-implement-v2.1b.pdf. Consult section 3.1.1 for installation of required third party software.

5) After completion of step 4 above, below are the VLSR installation instructions:

5a) cd dcn-software-suite-0.3/dragon/dragon-sw

5b) ./do_build.sh [target]

The option [target] tells what kind of control entity to build. The control

entity could be one of the following.

vlsr -- A generic VLSR that uses automatic probe to determine switch type

vlsr-verbose -- Build a VLSR with user's interactive input

vlsr-force10 -- A VLSR that operates on a Force10 E300/E600 switch

vlsr-force10-v6 -- A VLSR that operates on a Force10 switch with software version 6.x.x.x

vlsr-raptor -- A VLSR that operates on a Raptor E1010 switch

vlsr-cat3750 -- A VLSR that operates on a Cisco Catalyst 3750 switch

vlsr-cat6500 -- A VLSR that operates on a Cisco Catalyst 6500 switch

vlsr-linux -- A VLSR that operates on the Linux host using brctl/vconfig

vlsr-subnet -- Ethernet-over-SONET subnet control

csa -- An Client System Agent

narb -- Supporting software components for NARB sever.

Without provided the [target] option, the default option will be vlsr.

5c) ./do_install.sh

After successful installation, the following message will be displayed:

----

dragon-sw install finished.

```
   #########################################################
   #                                                       #
   #     Instructions for configuration and running        #
   #                                                       #
   #########################################################
```

Samples of configuration files have been installed under /usr/local/dragon/etc/.

Before running, customize your configuration files following the samples.

on VLSR, you need zebra.conf, ospfd.conf, dragon.conf and RSVPD.conf.

on CSA, you need dragon.conf and RSVPD.conf.

After configuration, use /usr/local/dragon/bin/dragon.sh to start the service.

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6) Prior to use, VLSR configuration files will need to be edited to reflect a specific network topology. The dragon-vlsr-implement-v2.1b.pdf document contains instructions for these configurations. In addition, this document contains a detailed set of installation instructions for those who would like to tailor their installation parameters beyond the default installation instructions presented above.

The DRAGON VLSR includes capabilities for several modes of operation which are controlled via build options and configuration files. These are described in the dragon-vlsr-implement-v2.1b.pdf document. For use with the Internet2 IDC the recommended configuration mode is VLSR-to-VLSR provisioning as described in Section 7 of dragon-vlsr-implement-v2.1b.pdf document.
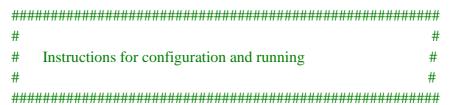
2.2 NARB/RCE Installation and Configuration

The dragon-sw must have been installed, as outlined in section 2.1 above (with target option = narb), before the NARB/RCE software installation. To install the DRAGON NARB/RCE software issue the following commands:

1) cd dcn-software-suite-0.3/dragon

2) tar –xvf dragon-sw-snapshot.2008Apr29.tar.gz

3) cd narb-sw

4) ./do_build.sh

5) ./do_intall.sh

After successful installation, the following message will be displayed.

```
    -------------------------------------------------

    narb-sw-installer install finished.

    ##########################################################
    #                                                        #
    #     Instructions for configuration and running         #
    #                                                        #
    ##########################################################


    Samples of configuratin files have been installed under /usr/local/dragon/etc/.

    Before running, customize your configuration files following the samples.

    You need zebra.conf, ospfd-intra.conf, ospfd-inter.conf and narb.conf.
```

To run NARB, you must have installed the dragon software suite.

After configuration, use '/usr/local/dragon/bin/dragon.sh start-narb' to start the service. To start NARB separately, use /usr/local/dragon/bin/run_narb.sh.

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6) Prior to use, NARB/RCE configuration files will need to be edited to reflect a specific network topology. There are three documents located in the narb-sw/doc directory:

- Network Aware Resource Broker (NARB) and Resource Computation Engine (RCE) Architecture: narb-rce-architecture-v2.1b.pdf

- Network Aware Resource Broker (NARB) Design and User Manual Document: narb-design-user-manual-v2.1b.pdf

- Resource Computation Element (RCE) Design and User Manual: rce-design-user-manual-v2.1b.pdf

These documents contain detailed configuration instructions. In addition, these documents contain a detailed set of installation instructions for those who would like to tailor their installation parameters beyond the default installation instructions presented above.

The DRAGON NARB/RCE includes capabilities for several features and modes of operation which are controlled via configuration files. This includes features for InterDomain Routing, Path Computation, and Signaling. These are described in the above referenced NARB/RCE documents. When configured for use with the Internet2 IDC these advanced features are not currently utilized. The recommended DRAGON configuration mode for use with the Internet2 IDC is a single domain configuration as described in the DRAGON documentation. These other advanced NARB/RCE feature will be utilized in a subsequent release to remove the need for the IDC configuration to require manual configurations for Network Topology Description and IntraDomain/InterDomain routes. These manual configurations are as defined in section 5 of the DCN Software Suite v0.3: OSCARS Inter-Domain Controller (IDC) Installation Guide.

3   DRAGON Project
The VLSR and NARB/RCE software described in this document is a based on results from the National Science Foundation funded Dynamic Resource Allocation via GMPLS Optical Networks (DRAGON) project. Additional details regarding this project are available at http://dragon.east.isi.edu.