

IBM Telecom Analytics Solutions  
Last updated: 2016-08-18

*Customer Insight for Communication  
Service Providers Solution Guide*



**Note**

Before using this information and the product it supports, read the information in "Notices" on page 51.

**Product Information**

This document applies to IBM Telecom Analytics Solutions Version 1.0.4 and may also apply to subsequent releases.

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# Contents

<b>Introduction</b>	<b>v</b>
<b>Chapter 1. Overview</b>	<b>1</b>
<b>Chapter 2. Installation and configuration.</b>	<b>5</b>
Contents of the solution package	5
Overview of the installation and configuration process	5
Installing the Solution Installer	7
Prerequisites	8
Modifying the sudoers file for the Linux user who runs the installation	8
Configuring computer firewall settings required for the installation on Linux.	8
Installing the Solution Installer software.	10
Installing the solution content	11
Prerequisite	11
Deploying the installation files on the nodes	11
Installing solution datasets	12
Deploying reports and content on the Business Intelligence node	14
Installing the TELCO database	15
Creating a Cognos Analytics data source connection to the TELCO database	15
Deploying the Cognos Dashboards	16
Scheduling datasets.	17
Deploying IBM SPSS content	18
Loading data and starting the predictive analytics job	24
<b>Chapter 3. Using Customer Insight for Communication Service Providers.</b>	<b>27</b>
Using the NPS correlation application	27
Using the churn management application	29
Using the over-the-top application.	33
Using the profile application.	37
<b>Appendix A. Accessibility features.</b>	<b>41</b>
<b>Appendix B. The data provision tool</b>	<b>43</b>
<b>Appendix C. Accessing the SLM log file</b>	<b>45</b>
<b>Appendix D. Troubleshooting</b>	<b>47</b>
Troubleshooting a problem	47
Troubleshooting resources	47
Troubleshooting known data provision tool error messages	49
Troubleshooting SPSS	50
After the Solution Installer is run, Chef processes are still running after the cleanup.sh script is executed	50
<b>Notices</b>	<b>51</b>
<b>Index</b>	<b>55</b>



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## Introduction

The Customer Insight for Communication Service Providers solution gives you the information and insight that you need to provide proactive service to your customers.

### Audience

This guide is intended for administrators and users of the Customer Insight for Communication Service Providers solution. It provides information on installation, configuration, and use of the Customer Insight for Communication Service Providers solution.

### Finding information

To find product documentation on the web, including all translated documentation, access IBM® Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).

### Accessibility features

Accessibility features help users who have a physical disability, such as restricted mobility or limited vision, to use information technology products. Some of the components included in the Customer Insight for Communication Service Providers have accessibility features. For more information, see Appendix A, “Accessibility features,” on page 41.

Customer Insight for Communication Service Providers HTML documentation has accessibility features. PDF documents are supplemental and, as such, include no added accessibility features.

### Forward-looking statements

This documentation describes the current functionality of the product. References to items that are not currently available may be included. No implication of any future availability should be inferred. Any such references are not a commitment, promise, or legal obligation to deliver any material, code, or functionality. The development, release, and timing of features or functionality remain at the sole discretion of IBM.

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## Chapter 1. Overview

The IBM Customer Insight for Communication Service Providers is a prepackaged solution that works with IBM Predictive Customer Intelligence 1.1.1.

**Important:** Before you install the application, IBM Predictive Customer Intelligence 1.1.1 must be installed on your system.

IBM Customer Insight for Communication Service Providers is a solution that drives improved marketing through advanced and predictive analytics of customer activity across locations, devices, applications, and interests. It highlights behavior-based information about customers using deep analysis of large volumes of raw and aggregate fixed line and mobile usage data, including internet usage and voice, and SMS activity.

The solution also provides a churn management application, utilizing standard churn modelling factors, as well as voice, SMS, and mobile data records, to analyze trends in subscriber voice, SMS, and mobile data usage and to interpret the churn model.

### What need does the solution address?

Customer experience teams have many unanswered questions due to limited data and analytics. Some of these questions include:

- Why are my customers not satisfied or happy?
- Why are our NPS® (or T-NPS) so low?
- What segment of customers has the most negative or positive influence on NPS?
- What changes are required in order to improve NPS?
- What can be done to improve customers' satisfaction and happiness?
- What are the factors impacting subscriber churn?
- Who is most likely to churn in the next few months and why?
- Who are my most valuable customers?

To help address these questions, IBM Customer Insight for Communication Service Providers is composed of three separate components:

- an NPS correlation model, predictive algorithm, and reporting suite
- a churn segmentation, scoring, and prediction model
- an over-the-top application
- a user profile application
- a customer behavior and profile dataset

### What does the NPS correlation application provide?

The solution helps customer experience team members in the telecommunications industry to determine customer insights by drilling down into Net Promoter Score (NPS) data and providing filters on key factors based on out-of-the-box correlations with network data. The NPS predictive index measures the likeliness of customers to recommend a company's offerings. It is used to gauge a customer's overall satisfaction and brand loyalty.

IBM Customer Insight for Communication Service Providers analyzes subscribers' relative satisfaction or happiness with their service based on NPS. The solution allows users to drill down into the data to determine specific issues that correlate with negative NPS. The solution's metrics can be used to:

- proactively address key issues impacting churn and other issues
- measure and correlate NPS with subscriber network experience
- improve customer experience and reduce attrition by improving their NPS

The NPS correlation application includes an IBM Cognos user interface, which is described in the workflow procedure:

- a report of prioritized factors impacting transactional-NPS (T-NPS)
- the ability to quickly view the top factors that negatively affect T-NPS scores within appropriately grouped categories, such as customer, data activity, device, and location
- access to various data sources to build the profiles of a typical promoter and detractor, which can be used to infer the profiles' impact across the customer base, gauging NPS for all customers based on similar experience
- combining of data sets such as 2G, 3G, 4G LTE data, NPS survey results, cell, CRM, and device provisioning to create a single Subscriber Analytics Record for each subscriber
- predictive models, which correlate subscriber analytics records to identify and address possible causes for poor NPS

The solution is delivered with predefined industry data models, use case specific metrics, and interactive reports.

### **What does the churn management application provide?**

The churn management application provides an analysis of subscriber data suggesting how and when a customer is likely to churn. The application includes an IBM Cognos user interface, which is described in the workflow procedure:

- a churn overview providing a relative segmentation of subscribers, based on their churn likelihood
- the ability to filter subscribers based on key factors, including churn propensity, customer value (a "keep score"), predicted churn date, churn factors, and contract type

The churn management application helps customer experience team members to understand subscriber experience trends across different "experience" categories, such as mobile data activity (including connectivity and retransmissions), voice, SMS, web browsing, and video. These inputs provide important insights into a subscriber's experience and are valuable when attempting to predict churn. Furthermore, not all subscribers are equally valuable to Communication Service Providers. Therefore, this solution provides a "keep score" for each subscriber, using a scale of 1-100, with 100 being the most valuable.

### **What does the over-the-top application provide?**

The over-the-top (OTT) application delivers pre-built out-of-the-box dashboards that Communication Service Providers can use to quickly visualize changing trends in how customers are using devices and applications.



The dashboards can be filtered by relevant categories, such as price plan or application. Some of the key visualizations available on the OTT dashboards include the following:

- top 10 fastest growing OTT applications by volume usage
- top 10 video, music, and voice/messaging applications by percentage of customers
- top OTT applications by volume for the previous 7 days
- top OTT applications by number of customers
- top 20 applications by average daily volume
- top 20 devices by total volume
- percentage customer change by application
- percentage customer change by device
- percentage volume change by device

### **What does the user profile application provide?**

The user profile application gives Communication Service Providers the ability to view the type of customer profiles using their network.

The dashboards can be filtered by relevant categories, such as mobility profile, age, gender, or device. Some of the key visualizations available are based on the number of subscribers and include the following:

- mobility profile
- age range
- gender
- usage profile
- device

The application also provides a dashboard that can be filtered by IMSI, providing visualizations on :

- device used
- mobility, usage, and experience profiles
- home, work, and weekend locations
- top categories, domains, and interests

### **What does the customer behavior dataset provide?**

The customer behavior dataset is a set of tables customers can access, along with an accompanying data dictionary. The dataset contains subscribers' usage data, including their interests, preferences, and profile. The application analyzes the amount of time subscribers spend browsing, searching, reading, and streaming information on their devices. Each period of activity is categorized, where possible, into one of hundreds of interest categories, enabling communication service providers to categorize their subscribers into hundreds of different micro-segments based upon these interests.



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## Chapter 2. Installation and configuration

The IBM Customer Insight for Communication Service Providers solution is for use with IBM Predictive Customer Intelligence.

Customer Insight for Communication Service Providers consists of the following nodes:

- An Analytics Platform node.
- A Mediation node.
- A Business Intelligence node.
- A Predictive Analytics node.
- A data node.

**Note:** The IBM Predictive Customer Intelligence topology includes an Integration Bus node, which is not used in the Customer Insight for Communication Service Providers solution.

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### Contents of the solution package

The IBM Customer Insight for Communication Service Providers solution package contains several parts.

The following parts are included in the solution package:

- Solution Installer. This puts the installation packages on the nodes required for a particular deployment architecture.
- IBM SPSS® Collaboration and Deployment Services packages. This is used for managing SPSS models used in the solution.
- IBM Cognos® Business Intelligence (BI) reports and dashboards.
- The Analytics Platform contains the software for data management and ETL (extract, transfer, and load) and will be installed on the Analytics Platform and Streams nodes.

---

### Overview of the installation and configuration process

This is an overview of the general tasks that you must perform to install and configure the Customer Insight for Communication Service Providers solution.

The following diagram provides a high-level overview of the installation and configuration process.

# Installation

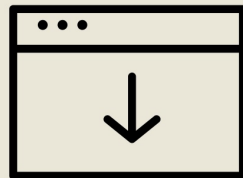
## Overview

In a few simple steps



### 1 DOWNLOAD PACKAGES

Download packages to the installation server and ensure network connectivity between all nodes in the deployment.



### 2 INSTALL/CONFIGURE THE NODES

Install the Analytics Platform data and Mediation node (or nodes)



Analytics Platform data nodes

Analytics Platform mgmt node

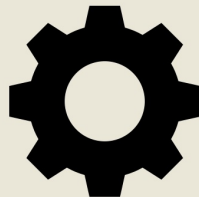


Mediation nodes

You may have multiple streams and hadoop nodes, including a minimum one hadoop management node per three data nodes

### 3 INSTALL THE INSTALLER

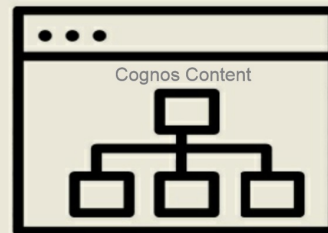
Install the Solutions Installer and configure it to identify the computers where the parts of the solution will reside.



The installer copies the required installation files for the specified servers.

### 4 INSTALL/DEPLOY CONTENT

Deploy installation files and content on the nodes, as well as set up tools, reports, and connections.



DB2 node

BI node

Predictive Analytics node

Perform the following tasks:

1. Plan where you want the various parts of the solution to reside. For example, you must decide which computers to use for the Analytics Platform data node and the Analytics Platform streams node.

2. Install and configure IBM Analytics Accelerator Framework for Communication Service Providers and the prerequisite software, including PCI 1.1.1.
3. Load data onto the Analytics Accelerator Framework Platform and verify this data.
4. Run the Solution Installer to deploy the installation files to the relevant nodes at the application layer.
5. Install the Solution datasets.
6. Install the TELCO database.
7. Create the TELCO datasource.
8. Deploy SPSS content.
9. Install IBM Cognos reports.
10. Install IBM Cognos Dashboards. (Do not include framework steps, as they are not required.)
11. Confirm that the reports and dashboards are connecting to BigInsights and reading the data correctly.

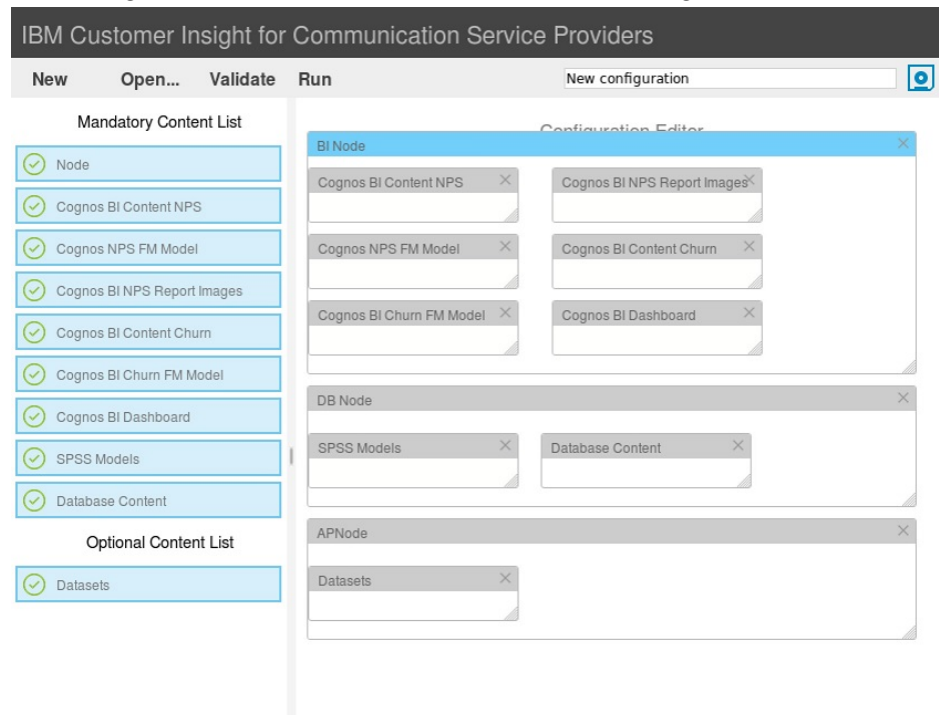
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## Installing the Solution Installer

The Solution Installer is used to configure and deploy solution content on the PCI-based nodes in your deployment, including the BI node and the Predictive Analytics node. To use the installer, you must first perform the prerequisites and then the steps for installing the Solution Installer.

**Note:** The Solution Installer referred to in this section is the Solution Installer for the Customer Insight for Communication Service Providers solution and not the PCI solution.

The configuration for the installer is shown on following screen:



## Prerequisites

Before you install the Solution Installer for the Customer Insight for Communication Service Providers solution, there are prerequisites that must be met.

Ensure the following conditions are met before you install the solution:

- You have a Red Hat Enterprise Linux operating system that you can install to. The Solution Installer works only on that version of Linux.
- You understand your deployment environment. There are a combination of nodes that you must install to, so you need to determine where you want the various components of the solution to reside.
- You have modified the sudoers file for the user who runs the installation.
- You have configured your computer firewall settings for the installation of Linux.

## Modifying the sudoers file for the Linux user who runs the installation

To run the Customer Insight for Communication Service Providers installation in a Linux environment, you must be either root user or have sudo permission on each node computer, and you must disable requiretty during the installation.

To install with sudo user permissions, you must add the user to the sudoers file.

### Procedure

1. Log in as root user.
2. Enter the following command to open the sudoers file for editing:  
`visudo -f /etc/sudoers`
3. Locate the following line:  
`Defaults requiretty`
4. Press the I key to insert text.
5. Type a number sign (#) in front of `Defaults requiretty` to comment out the line. For example, the line will appear as `#Defaults requiretty`
6. If you run the installer as a user with sudo user permissions, go to the end of the file, and add the following line for your user:  
`username ALL=(ALL) NOPASSWD: ALL`
7. Press the Esc key, and enter `:wq` to save and close the file.
8. Repeat these steps on each computer on which you install a Customer Insight for Communication Service Providers node.

## Configuring computer firewall settings required for the installation on Linux

The Solution Installer requires bidirectional communication with each node when you install a server component or server artifact component, and your firewall can interfere with this communication.

To ensure bidirectional communication, you must configure your firewall settings for the installation. Alternatively, you can temporarily disable your firewall during the installation.

A script is provided to open all necessary ports on the installation node. You can either use the `firewall.sh` script, open the ports manually, or disable the firewall settings.

In addition to opening ports on the installation node computer, you must open some ports on each computer to which content from the solution will be copied. You can either disable all firewall settings temporarily or use the `firewall.sh` script, as described in this document.

### **Disabling firewall settings prior to installation with the Solution Installer (optional)**

If you choose to temporarily disable your computer's firewall during the installation of the Customer Insight for Communication Service Providers solution, ensure that you enable the firewall on each node after the installation is complete.

#### **About this task**

**Important:** If you disable your computer's firewall during the installation, you must still ensure that the required ports are opened on each node computer when you restart your firewall.

#### **Procedure**

1. Log on to the computer as the root user or as a user with sudo permissions.
2. Type the following command:  

```
/etc/init.d/iptables stop  
/etc/init.d/iptables save
```
3. Repeat these steps on each computer on which you install a node and on the server from which you are running the installation.

#### **What to do next**

After the installation is complete, on each node, type `/etc/init.d/iptables start` to restart your firewall.

### **Manually configuring firewall settings on the installation node during installation with the Solution Installer**

Disable your firewall settings using the `firewall.sh` script. The script must be run on the computer used by the Solution Installer and each node that will contain content from the solution. You can run the `firewall.sh` script to open the ports on a Linux installation node.

#### **About this task**

The `firewall.sh` script opens the following ports on the Solution Installer node:

- 8080 incoming
- 443 incoming
- 9683 incoming
- 22 outgoing

#### **Procedure**

1. As the root user or as a user with sudo permissions, log on to the computer that contains the solution installer node.

2. Back up your existing firewall settings by typing the following command:  
`/etc/init.d/iptables save.`
3. Run the `firewall.sh` script.

## Installing the Solution Installer software

Before you use the Solution Installer to configure and deploy the nodes in a Linux environment, you must install the Solution Installer.

### Before you begin

The working directory for solution installation files is `opt/IBM`

### About this task

Here is a short video that shows you how to install the Solution Installer:

<http://youtu.be/9u6ZOk8iyt4>

Please note the version numbers shown in the video may have been updated (the video will still be relevant). The steps that are shown in the video are described in the following procedure.

### Procedure

1. Log on to the computer where you downloaded the solution package.
2. Decompress the solution package.
3. If the Solution Installer (including the IBM Predictive Customer Intelligence Solution Installer) has been run on the computer previously, run the following command on each of the nodes:  
`./cleanupClient.sh`
4. Go to the Solution Installer directory in the following location:  
`opt/IBM/IS_CSP_Customer_Insight_1.0.4/SolutionInstaller.`
5. If you haven't already opened the ports that are required by the Solution Installer, you can open them by running the following command:  
`./firewall.sh`
6. Enter the following command:  
`sh setup.sh username first_name last_name email password`  
This command creates a user (with the details supplied) for accessing the Solution Installer web server.  
The web server is started and the URL for the Solution Installer displays in the command line window.
7. A browser window might open automatically. If it doesn't, copy and paste the URL into a web browser and bookmark it.

### What to do next

Use the Solution Installer to deploy the installation files to the nodes in your solution.



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## Installing the solution content

Installing the solution content involves deploying installation files and content on the nodes, installing datasets, configuring the TELCO DB2 database, configuring ETL, configuring SPSS content, deploying reports, dashboards, and creating a connection to BigInsights.

### Prerequisite

Before you install the Customer Insight for Communication Service Providers solution content, there is a prerequisite that must be met.

Ensure that IBM Predictive Customer Intelligence version 1.1.1 is installed and configured and you have applied all known fix packs to it.

**Note:** When installing PCI, you need an additional temporary server from which to run the PCI Solution Installer. See also this Technote: <http://www-01.ibm.com/support/docview.wss?uid=swg21612290>

### Installing IBM Predictive Customer Intelligence version 1.1.1

To install PCI version 1.1.1, refer to the IBM Predictive Customer Intelligence *Installation Guide* 1.1.1 on IBM Knowledge Center.

Ensure that you adhere to the following sections in this guide:

- Prerequisites and installation preparation
- Solution architecture
- Supported operating systems and hardware requirements
- Prerequisites for using the solution installer
- Install IBM Predictive Customer Intelligence by using the solution installer
- Manually install IBM Predictive Customer Intelligence
- Troubleshooting (if necessary)

Install PCI on the designated PCI nodes in your deployment.

**Note:** The CI SPSS models require the modeler server to be installed at `/usr/IBM/SPSS/ModelerServer/17.1/`

### Deploying the installation files on the nodes

You use the Solution Installer to deploy the installation files to the appropriate nodes in your solution.

#### Before you begin

Ensure that you know the URL for accessing the Solution Installer.

Ensure that you know the following information for each of the nodes in your solution:

- Host name or IP address
- A user ID and password that has write permissions to the `/opt/` directory.

Each node must also meet the following requirements:

- Has a valid DNS name that is resolvable.

- Does not have Chef server or client software installed on it.

## About this task

In this task, you create an installation configuration of your solution by dragging objects onto a canvas, adding components to the objects, and defining properties for the components.

**Important:** The Solution Installer runs on the latest versions of Chrome and Firefox. It does not run on Internet Explorer and it is untested on Safari.

## Procedure

1. In a web browser, go to the Solution Installer.
2. Read the license agreement and click **Accept**.
3. Click **New Configuration** and then click **OK**.
4. From the **Mandatory Content List** pane, select **Node**.  
A visual representation of an empty node is displayed on the canvas.
5. In the **Property Editor**, type a name for the node, and in the **Host Name** box, specify the server on which the node will be placed.  
For example, you might create a node that is named Cognos Analytics node (or Cognos BI node).
6. Enter a username and password for a user that has sudo access.  
If you click **Validate** before all the mandatory content is added, a message indicates that the node is not valid. For example, if you validate the Cognos Analytics node before adding Cognos Analytics (BI) content, then a message indicates that the node is not yet valid.
7. From the **Optional Content** list, drag any content that you want to add into the appropriate node. The reason that this content is optional is because you might already have some of the necessary components installed in your environment.
8. For every node that you want to add content to, define the node and then drag content objects onto it.
9. If you want to save the configuration to use or refer to in the future, click **Save Configuration**.
10. Click **Validate**. The progress of the validation is displayed. If the validation fails, look at the log file to troubleshoot the problem.
11. After all nodes are defined, the contents are specified, and each node is validated, click **Run**. The scripts and files that are used to install and configure the solution are copied to the target nodes.

## What to do next

Complete the installation of the solution on each of the nodes.

## Installing solution datasets

Use the following procedure to install your solution datasets.

### Procedure

1. As the root or sudo user, start the installer from the directory where you uncompressed the installation package:  

```
$ sudo ./analytics-platform/install_telsol.sh
```

The following flags may be passed to the script:

Flag	Meaning
<code>--dont_validate_biginsights</code>	The validation of IOP and BigInsights takes a few minutes to run. To save time, this validation step can be skipped by passing this flag.
<code>-h</code>	Prints a message describing the script usage and exits.

- When installing each use case, the installer will check for an existing installation of that use case and ask if it should be replaced with the version from the installation package. Provide the answer that applies to your situation. For example,

```
-- Installing Customer Behaviours use case...
```

```
Checking for existing installation of Customer Behaviours use case...
```

```
WARNING: Previous installation of Customer Behaviours use case found: customer-behaviours -
Remove? (y/n):
```

Answering `y` will result in the removal of the existing use case. The question will be asked a second time to confirm removal. If the existing installation is removed, the installation of the new version will proceed automatically after the removal.

- Most use cases can run using default configuration values. If non-default configuration values are required for any use case, you can change those values after installation and before the use case is run. However, the Net Promoter Score use case is an exception: the installer will prompt you for the values for the following NPS configuration settings, because they have no valid default values. Enter the required values.

Name	Value
<code>NPS_BUCKET_SIZE</code>	Set this to as high as possible based on the size of your cluster (reducers), for example, 30.
<code>OPERATOR_MCC_MNC</code>	Example: <code>'1234','3198'</code>

- Some use cases require data provided by the CSP to be loaded (provisioned) into the database before they are run (for example., CRM data). This data should be provided in the form of CSV files. Before attempting to provision your data, the installer will pause to ensure that these files are available in the correct directory.

```
-- Loading provisioned data...
```

```
Provisioning data to be loaded must be stored as CSV files in
/opt/tnf/apps/bis-main-var/bisprovisioning-tool/csv_files/ -
```

```
if you have any data to provision, please copy it to that directory now and press any
key to resume...
```

```
If the provisioned data CSV files have not already been copied to that directory, do
it now and press any key to
```

```
resume the installer which will attempt to load them. It will determine which files
should be loaded into which
```

```
tables based on the filenames and ask for confirmation that the correct files are being
loaded to the correct
```

```
tables, e.g.,:
```

```

Table to load data to ----- Data file

cb_category ----- csv_files/cb_category_20150320.csv
cea_unacceptable_trend_config ----- csv_files/cea_unacceptable_trend_config_00000000.csv
nps_cell_provisioning_table ----- csv_files/nps_cell_provisioning_table_20150331.csv
nps_crm_provisioning_table ----- csv_files/nps_crm_provisioning_table_20150331.csv
nps_device_provisioning_table ----- csv_files/nps_device_provisioning_table_20150331.csv
nps_survey_table ----- csv_files/nps_survey_table_20150429.csv
performance_assign_config ----- csv_files/performance_assign_config_00000000.csv
Load data to tables according to the list? (y/n):

Review this information and provide the appropriate response. Upon successful
installation, the following message is displayed:

-- IBM Telecom Solutions installed completed successfully!

The entire session is logged in install_telsol.log in the current directory.

```

## Deploying reports and content on the Business Intelligence node

You must deploy the report, dashboards, and images for the Customer Insight for Communication Service Providers solution.

### Procedure

1. Log on to the BI node as the **root** user or as a user with **sudo** permissions.
2. As a **root** user, copy CI-nps-images-1.0.4.zip from /opt/IBM/IS\_CSP\_Customer\_Insight\_1.0.4/ and unzip the contents into/opt/ibm/cognos/analytics/webcontent/bi/samples/images/
3. As a **root** user, copy CI-nps-report-1.0.4.zip from /opt/IBM/IS\_CSP\_Customer\_Insight\_1.0.4/ to /opt/ibm/cognos/analytics/deployment
4. As a **root** user, copy CI-churn-report-1.0.4.zip from /opt/IBM/IS\_CSP\_Customer\_Insight\_1.0.4/ to /opt/ibm/cognos/analytics/deployment
5. On a web browser, navigate to <localhost>:9300/bi. This opens the IBM Cognos Analytics page.
6. From the menu on the left-hand side of the page, click **Manage** and then click **Administration Console**. This opens IBM Cognos Administration Console in a new tab.
7. Click **Configuration** and then click **Content Administration**. This opens a page view of the content to be imported and exported.
8. Click the **New Import** symbol from the menu on the right-hand side of the page. This launches the **New Import** wizard.
9. Select CI-nps-report-1.0.4.zip and click **Next**.
10. On the **Specify a name and description** page, accept the defaults and click **Next**.
11. On the **Select the public folders, directory and library content** page, select all the folders which appear and click **Next**.
12. On the **Specify the general options** page, accept the defaults and click **Next**.
13. On the **Review the summary** page, accept the defaults and click **Next**.
14. On the **Select an action** page, accept the defaults and click **Finish**.
15. On the **Run with options** page, accept the defaults and click **Run**.
16. On the final wizard page, click **OK**.
17. The import should now be visible on the **Content Administration** page. Repeat steps 5 to 12 for CI-churn-report-1.0.4.zip

## Installing the TELCO database

To install the TELCO database on the data node, you run a script that creates the TELCO database, tables, constraints, and indexes.

### Procedure

1. Log on to the data node with a user ID that has access to the IBM DB2® database. For example, **db2inst1**.
2. Navigate to `/opt/IBM/IS_CSP_CustomerInsight_1.0.4/CSP_CustomerInsight_DBLoader/script/`
3. Enter the following command to run the script:  
`db2 -tvf TELCO_Db2.sql`
4. Verify that the database tables exist. Type the following commands:

a.

```
db2 connect to TELCO;
db2 list tables for schema NPS;
```

Information similar to the following message is displayed:

FACTOR_IMPORTANCE	NPS	T	2015-06-07-22.46.41.072519
FACT_SCORE	NPS	T	2015-06-07-22.46.41.815746
MASTER_CUSTOMER	NPS	T	2015-06-07-22.46.41.833610
MASTER_DATA_ACTIVITY_LOCATION	NPS	T	2015-06-07-22.46.41.848970
MASTER_DEVICE	NPS	T	2015-06-07-22.46.41.864207
PREDICTED_NETWORK_NPS_SCORE	NPS	T	2015-06-07-22.46.41.864587
PREDICTED_SUBSCRIBER_NPS_SCORE	NPS	T	2015-06-07-22.46.41.864940
STAGING_NPS_SCORE_TABLE	NPS	T	2015-06-07-22.46.41.865220

b. `db2 list tables for schema BBCI`

Information similar to the following message is displayed:

CGR_DEVICE	BBCI	T	2015-09-09-02.12.13.907406
CHURN_DATA	BBCI	T	2015-08-20-15.56.39.964202
CHURN_MANAGEMENT	BBCI	T	2015-08-19-01.33.27.083252
CHURN_MANAGEMENT_HISTORY	BBCI	T	2015-09-11-16.47.45.466452
SUBSCRIBER_BILLING	BBCI	T	2015-09-11-16.03.21.410002
SUBSCRIBER_CARE	BBCI	T	2015-09-11-16.04.12.393064
SUBSCRIBER_CRM	BBCI	T	2015-09-11-16.05.00.176739
SUBSCRIBER_LEVEL_CX_SCORE_WEEKLY	BBCI	T	2015-08-20-16.02.13.778290
CHURN_TREND	BBCI	T	2015-08-20-16.01.00.876379
TOP_CHURN_FACTORS	BBCI	T	2015-08-20-16.00.52.486780

## Creating a Cognos Analytics data source connection to the TELCO database

You must create a data source connection from the Business Intelligence node to the IBM DB2 database that is on the data node.

### Procedure

1. Open a web browser on the BI node.
2. Navigate to the IBM Cognos Analytics page.
3. Click **Manage** and then click **Data servers**.
4. Click **Add a dataserver**.
5. Based on the connection information that is provided by your database administrator, enter the appropriate information. If applicable, select the authentication mode to be used.

Type: db2  
Name: TELCO  
Server: db server  
Port: 50000  
DB: TELCO  
User: db2inst1

6. Click **Test** to test the connection. On the **View the results** page, ensure that the status of the connection tests for the dynamic query mode is **Succeeded**.
7. Click **Save**.

## Deploying the Cognos Dashboards

Installation of the dashboards includes installing the dashboards, datamodule, and dataserver.

### Procedure

1. Log on to the BI node as the **root** user or as a user with **sudo** permissions.
2. As a **root** user, copy `ci-dashboards-1.0.4.zip` from `/opt/IBM/IS_CSP_Customer_Insight_1.0.4/` to `/opt/ibm/cognos/analytics/deployment`
3. On a web browser, navigate to `<localhost>:9300/bi`. This opens the IBM Cognos Analytics page.
4. From the menu on the left-hand side of the page, click **Manage** and then click **Administration Console**. This opens IBM Cognos Administration Console in a new tab.
5. Click **Configuration** and then click **Content Administration**. This opens a page view of the content imported and exported to and from Cognos.
6. Click the **New Import** symbol from the menu on the right-hand side of the page. This launches the **New Import** wizard.
7. Select `ci-dashboards-1.0.4` and click **Next**.
8. On the **Specify a name and description** page, accept the defaults and click **Next**.
9. On the **Select the public folders, directory and library content** page, select all the folders which appear and click **Next**.
10. On the **Specify the general options** page, accept the defaults and click **Next**.
11. On the **Review the summary** page, accept the defaults and click **Next**.
12. On the **Select an action** page, accept the defaults and click **Finish**.
13. On the **Run with options** page, accept the defaults and click **Run**.
14. On the final wizard page, click **OK**.
15. The import should now be visible on the **Content Administration** page. Repeat steps 5 to 12 for `ci-churn-report-1.0.4.zip`
16. Return to the **IBM Cognos Analytics** page, click **Manage** and then click **Data servers**.
17. Click **bbci-ott-datasource** and then click it again on the next tab that opens on the page.
18. Select **Connection details** from the ... (three dot) menu.
19. Update the connection details. The RA environment details are:  
connection name: `bbci-ott-datasource`  
port: `32051c`  
database: `bigsql`  
  
You will then need to refresh the Cognos datasource.
20. Click **bbci-ott-datasource**.

21. Next to **Cognos**, click **More...** Wait until the status changes to **Succeeded**.

## Scheduling datasets

Datasets are run on a scheduled basis using tables that containing customer information.

Most datasets are run on an hourly, daily, or weekly basis, through cron jobs that are added to a boss's crontab as part of the dataset rpm installation. These can be viewed and modified by running `crontab -e` as a boss on your Analytic Server node. In a default install, here is the scheduling you will see across the various datasets:

Dataset	Schedule
customer-profile-data-setup	0.30, every Monday morning (weekly tables)
ott-applications	02.30, every Monday morning (weekly tables)
customer-profile	02.30, every Monday morning (weekly tables)
user-profile	04.30, every Monday morning (weekly tables)
customer-behaviours	<ul style="list-style-type: none"><li>• *.45, every hour (hourly tables)</li><li>• 03.15, every day (daily weighted interest tables)</li><li>• 03.30, every day (daily other tables)</li><li>• 00.30, every Monday morning (weekly tables)</li></ul>

SPSS jobs are triggered from the customer-profile-data-setup dataset. For more information, see "SPSS job triggering." This dataset runs at 00.30 on a Monday, two hours before the next dataset is run. If a dataset's models are processing a large amount of data that does not complete before subsequent, dependent datasets are triggered, the dependent datasets will run with old data. It may be necessary to push back the schedules of those datasets to ensure they are not being triggered before all necessary processing completes. To do so, edit the dataset run schedules in crontab `-e`. Press **a** while in crontab to make the entries editable, then modify either of the first two fields (which indicate the minute and hour, respectively, in which to run the command on that line). For example, to push `ott-applications` back by an hour, change the second field in the `run_ott-applications.sh` line from 2 to 3, then press **Esc**, **w**, **q**, and **Return** to save and exit.

### SPSS job triggering

This topic describes how SPSS jobs are triggered from the customer-profile-data-setup dataset.

Numerous SPSS models generate output from the tables populated by the customer-profile-data-setup dataset. When this dataset is run, the models which depend on this dataset are triggered automatically through Collaboration & Deployment Services (C&DS). The files which specify the target C&DS instance and the details of the jobs to be run are located in the customer-profile-data-setup/config folder. The server connection properties are found in `spss_server.properties`.

After setting the username and password properties, the `encodePasswordProperties.sh` script (also located in the `config` directory) should be run on this file. Job-specific details are given in the `.job_properties` files, where each `.job_properties` file corresponds to a single stream to be run through C&DS. The properties in these files are:

**SPSSID:** The C&DS job ID, which can be found in the C&DS dashboard by selecting the job in the Content Repository and then selecting **Properties** from the right-click menu.

**SPSSTriggerModel:** A boolean value, which can be set to `false` to quickly disable the automatic execution of this job (if required).

**SPSSRunSchedule:** A comma-separated list of the days on which this model should be run, using a day's three-letter code, such as `mon`, `tue`, `thu`. Note that a model will only be triggered after running `customer-profile-data-setup`, so a model will trigger only if set to run on the same day as `customer-profile-data-setup`.

**PrerequisiteJobs:** An optional field, which allows you to specify job dependencies. Some models rely on the output of other models, so those models must not be triggered until all the models on which they depend have been triggered and completed. The value is a comma-separated string of job names. For example, the `customer_profile_best_time_and_medium` models depend on output from the `customer_profile_location_affinity` model, which is also triggered by `customer-profile-data-setup`, so `customer_profile_best_time_and_medium.job_properties` specifies a `PrerequisiteJobs` value of `customer_profile_location_affinity` to ensure it waits for `customer_profile_location_affinity` to complete before running. Note that jobs which do not specify any prerequisites will run as normal, without dependencies.

## Deploying IBM SPSS content

You must create a data source connection, and then import the content files into IBM SPSS Deployment Manager for Collaboration and Deployment Services.

### Before you begin

Ensure that the following things are in place:

- IBM SPSS Collaboration and Deployment Services Deployment Manager is installed on the client computer.
- The `CSP_CustomerInsight_CDS.pes` file is on the local client computer from which the deployment is performed. The default installation folder for this file is `/opt/IBM/IS_Customer_Insight_1.0.4/`.
- You know the admin credentials for the Predictive Analytics node, IBM DB2, and IBM SPSS Collaboration and Deployment Services.

### Procedure

#### Using the Analytics Platform node

1. Launch the IBM Analytic Server at `http://host:port/analyticsserver/admin/ibm`.
2. Log in using your Analytic Server Credentials.
3. Click **Datasources**.



4. Import each of the zip files located in the IS\_CSP\_Customer\_Insight\_1.0.4/analytics-platform/analyticserver\_datasources/ directory.
5. Select **Actions > Import > Browse** and select a data source.
6. Repeat steps 4-5 to import each of the data sources in the list.

### Using Deployment Manager

7. Start **Deployment Manager**.
8. Click **File > New > Content Server Connection**.
9. In the **Connection Name** field, enter a name that identifies the Predictive Analytics node.
10. In the **Server URL** field, enter `http://analytics_node_IP:9080` and click **Finish**.
11. Right-click **Content Repository** and click **Import**.
12. Browse to and select the CSP\_CustomerInsights\_CDS.pes file.
13. Click **Open**.
14. Accept the default options in the **Import** window, and click **OK**. The **CSP\_CustomerInsights\_NPS** folder, a job in the **Jobs** folder, and streams in the **Modeler Streams** folder are created.
15. Repeat steps 6-8 for the CSP\_CustomerInsights\_Profile.pes file.
16. Update the credential information for the **Admin**, **Db2inst1**, and **root** users so that the job and streams run successfully.
  - a. In the **Content Explorer** tab, under **Resource Definitions**, open the **Credentials** folder.
  - b. Update the **Admin** user with the credentials for the SPSS Collaboration and Deployment Services user that has access to the content repository and runs the job.
  - c. Update the **Db2inst1** user with the credentials for the user that has access to the IBM DB2 database.
  - d. Update the **root** user with the credentials for the user that has access to the Modeler Server.
17. Open the job in the **Jobs** folder and ensure that the user credentials match the credentials of the IBM DB2 instance on the **ODBC** tab.
18. Verify the server connections are correct for your environment. In the Content Explorer, open the Servers folder and verify the cads and modeler connections.
19. Create an ODBC connection with the name IBMPCI that points to the TELCO database on the data node.

For information about how to create an ODBC connection, see “Configuring ODBC for IBM SPSS Modeler Server on Linux operating systems.” In the `odbc.ini` file, specify the driver path as `/opt/IBM/SDAP711/lib/XEdb227.so`.

### Configuring ODBC for IBM SPSS Modeler Server on Linux operating systems

To use an ODBC data source with IBM SPSS Modeler Server on a Linux operating system, you must configure the environment.

#### Procedure

1. Stop the IBM SPSS Modeler Server.
2. Go to the `/root/SDAP711` directory.

The driver files are installed as part of the IBM Predictive Customer Intelligence Server deployment.

3. Run the `setodbcpath.sh` script to update the ODBC path in the scripts.
4. Edit the `odbc.sh` script to add the definition for ODBCINI to the bottom of the script. For example:

```
ODBCINI=/root/SDAP711/odbc.ini; export ODBCINI
```

ODBCINI must point to the full file path of the `odbc.ini` file for IBM SPSS Modeler. The `odbc.ini` file lists the ODBC data sources that you want to connect to. A default `odbc.ini` file is installed with the drivers.

5. In the `odbc.ini` file, add the data source and specify the driver in the [ODBC Data Sources] section of the file.

Add the TELCO data source as:

```
[ODBC Data Sources]
TELCO=IBM DB2 ODBC Driver
```

6. In the `odbc.ini` file, create a TELCO data source connection.

```
[TELCO]
Driver=/opt/ibm/db2/V10.5/lib64/libdb2o.so
DriverUnicodeType=1
Description=IBM DB2 ODBC Driver
ApplicationUsingThreads=1
AuthenticationMethod=0
BulkBinaryThreshold=32
BulkCharacterThreshold=-1
BulkLoadBatchSize=1024
CharsetFor65535=0
#Database applies to DB2 UDB only
Database=TELCO
DefaultIsolationLevel=1
DynamicSections=200
EnableBulkLoad=0
EncryptionMethod=0
FailoverGranularity=0
FailoverMode=0
FailoverPreconnect=0
GrantAuthid=PUBLIC
GrantExecute=1
GSSClient=native
HostNameInCertificate=
IpAddress=IP_Address_of_DB_server
KeyPassword=
KeyStore=
KeyStorePassword=
LoadBalanceTimeout=0
LoadBalancing=0
LogonID=TELCO
MaxPoolSize=100
MinPoolSize=0
Password=password
PackageCollection=NULLID
PackageNamePrefix=DD
PackageOwner=
Pooling=0
ProgramID=
QueryTimeout=0
ReportCodePageConversionErrors=0
TcpPort=50000
TrustStore=
TrustStorePassword=
UseCurrentSchema=0
ValidateServerCertificate=1
WithHold=1
XMLDescribeType=-10
```

**Note:** You must use the driver library `libdb2o.so` with IBM SPSS Modeler. Ensure that you set `DriverUnicodeType=1` to avoid buffer overflow errors when you connect to the database.

7. If you are using the 64-bit version of IBM SPSS Modeler Server, define and export `LD_LIBRARY_PATH_64` in the `odbc.sh` script:

```
if [ "$LD_LIBRARY_PATH_64" = "" ]; then
LD_LIBRARY_PATH_64=<library_path>
else
LD_LIBRARY_PATH_64=<library_path>:$LD_LIBRARY_PATH_64
fi
export LD_LIBRARY_PATH_64
```

Where `<library_path>` is the same as for the `LD_LIBRARY_PATH` definition in the script that was initialized with the installation path. For example, `/opt/spss/odbc/lib`.

**Tip:** You can copy the `if` and `export` statements for `LD_LIBRARY_PATH` in the `odbc.sh` file, append them to the end of the file. Then, replace the `LD_LIBRARY_PATH` strings in the newly appended `if` and `export` statements with `LD_LIBRARY_PATH_64`. Here is an example of the `odbc.sh` file for a 64-bit IBM SPSS Modeler Server installation:

```
if [ "$LD_LIBRARY_PATH" = "" ]; then
LD_LIBRARY_PATH=/opt/spss/odbc/lib
else
LD_LIBRARY_PATH=/opt/spss/odbc/lib:$LD_LIBRARY_PATH
fi
export LD_LIBRARY_PATH
if [ "$LD_LIBRARY_PATH_64" = "" ]; then
LD_LIBRARY_PATH_64=/opt/spss/odbc/lib
else
LD_LIBRARY_PATH_64=/opt/spss/odbc/lib:$LD_LIBRARY_PATH_64
fi
export LD_LIBRARY_PATH_64
ODBCINI=/opt/spss/odbc/odbc.ini; export ODBCINI
```

Ensure that you export `LD_LIBRARY_PATH_64`, and define it with the `if` loop.

8. Configure IBM SPSS Modeler Server to use the driver. Edit `modelersrv.sh` and add the following line immediately below the line that defines `SCLEMDNAME`:

```
. <odbc.sh_path>
```

Where `odbc.sh_path` is the full path to the `odbc.sh` file.

For example: `./opt/spss/odbc/odbc.sh`

Ensure that you leave a space between the first period and the file path.

9. Save `modelersrv.sh`.
10. Configure the IBM SPSS Modeler Server to use the ODBC wrapper named `libspssodbc_datadirect.so`.

- a. Go to the `/usr/IBM/SPSS/ModelerServer/17.1/bin` directory.
- b. Remove the existing `libspssodbc.so` soft link by using the following command:

```
rm -fr libspssodbc.so
```

- c. Link the new wrapper to `libspssodbc.so` by using the following command:

```
ln -s libspssodbc_datadirect_utf16.so libspssodbc.so
```

11. Configure the `db2cli.ini` file in `<db2 instance home>/sqllib/cfg/db2cli.ini` to add the sections for the TELCO database.

```
[TELCO]
Database=TELCO
Protocol=TCPIP
DriverUnicodeType=1
Port=50000
Hostname=IP_Address_of_DB_server
UID=username
PWD=password
```

12. Save `odbc.ini`.

## What to do next

To test the connection, do the following steps:

1. Restart IBM SPSS Modeler Server.
2. Connect to IBM SPSS Modeler Server from a client.
3. Add a database source node to the canvas.
4. Open the node and verify that you can see the data source names that you defined in the `odbc.ini` file.

For additional information and troubleshooting tips for connecting to data sources, see the SPSS Modeler documentation ([http://www.ibm.com/support/knowledgecenter/SS3RA7\\_17.1.0](http://www.ibm.com/support/knowledgecenter/SS3RA7_17.1.0))

## SPSS job sequencing and triggering

Specific processing jobs define execution sequences and triggering events for individual files stored in the IBM SPSS Collaboration and Deployment Services Repository.

For churn prediction, the jobs which perform the training of the model and the scoring of the model have been separated. The data for training needs to be prepared and loaded in the Customer Insight for Communication Service Providers churn tables. Once this is performed, the job `\CSP_CustomerInsight_NPS\Jobs\Training Churn Prediction Model` present in IBM SPSS Collaboration and Deployment Services needs to be run from the SPSS CADS Deployment Manager. This will create the predictive model nuggets which will be used subsequently in the job used to score the active customers. Failure to run this job before running the `\CSP_CustomerInsight_NPS\Jobs\Scoring Churn Prediction Model` will result in error.

The job `\CSP_CustomerInsight_NPS\Jobs\Scoring Churn Prediction Model` will be triggered each time the sqoop job for transferring the churn dataset from the Analytics Platform node to the DB2 data node is complete.

The job `\CSP_CustomerInsight_NPS\Jobs\Load Report Tables` will be triggered each time the sqoop job for transferring the NPS dataset from the Analytics Platform node to the DB2 data node is complete.

## Changing churn factor labels

You can change the churn factor labels to suit your business needs.

Each time the SPSS training job is run, it creates a decision list model. The decision list model nugget is then exported to a `.csv` file so that it can be provided as an additional input apart from the churn propensity and displayed in the Churn Management Report. The idea is to provide actionable insights for the churn along with providing the churn propensity and the expected churn date.

The decision list usually has a list of a few variables expressed as an if/else condition. A business analyst or user can interpret these segments and provide labels which can be used in the churn management report. This will help the users of the churn management report understand the reason for the churn. Providing of labels is optional. In the event that the label is not provided, the base ruleset that appeared in the decision list will appear in the churn factors column.

To provide the **Churn\_Factors** with easy to understand labels, the following steps need to be performed.

1. Copy the file `Decision List Formatted.csv` located in the folder `/opt/IBM/SPSS/ModelerServer/17.0/data` in the `SPSS/Analytics` node.
2. Open the comma separated file in a spreadsheet. You will see these columns: **ID**, **NBCORRECT**, **RECORD\_COUNT SCORE**, **CHURN\_RULES**, and **CHURN\_FACTORS**.
3. Input values in the **Churn\_Factors** column can be changed to something more meaningful. For instance, a churn rule from the decision list which states **OVERALL\_EXP\_SCORE\_5 greaterThan 0.500000** and **OVERALL\_EXP\_SCORE\_5 lessOrEqual 3** can be labeled as **Low Overall Experience Score** and entered in the **Churn\_Factors** column.
4. In the example in step 3, the scoring stream will identify **Low Overall Experience Score** as the churn factor and display the same based on the Rule Id.

## Improving the SPSS model performance

You can fine-tune the SPSS model performance.

The Model Training stream `Churn Prediction Model Training.str` is used to train the two predictive models that are used for scoring. The first predictive model is a decision list, which provides the rules to identify segments that have a higher propensity to churn, along with the propensity to churn. The second predictive model is a COX regression model, which uses the attributes of the customer to identify when they are likely to churn.

In the decision list, changing the following options can alter the performance characteristics, such as time needed to build the model and overall accuracy of the mode:

- Decreasing the minimum segment size will create smaller segments. When decreasing the minimum segment size, the maximum number of segments need to be increased correspondingly, so that you can adequately cover the population. For instance, with a minimum segment size of 0.5% and a maximum number of groups of 100, we are likely to cover upwards of 50% of the total population based on their propensity to churn. The rest of the population can be considered as likely to be active. However, increasing the maximum number of segments is likely to increase the model development time proportionately.
- Increasing the confidence interval for new conditions will decrease the number of segments formed. However, they will be more reliable segments.

The analysis weight is currently set as 3 for churned customers and 1 for active customers. This is set in the supernode **Data Cleansing** in the node **Analysis Weight**. This results in oversampling of churned customers. This will help provide importance to identifying churned customers. If the number of active customers is very high and there is a need to decrease model development time, the analysis weight can be changed to 1 for churned customers and 0.34 for active customers. This will result in undersampling of active customers and provide improvements in the model development time.

The **Analysis Weight** proportion should reflect the business priorities of how important it is to identify customers likely to churn over the ones that remain active. In an environment where there is a customer churn of 25% a year, an analysis weight of 3:1 might be good to make the importance equal in proportion. In an environment where customer churn is already 50%, an analysis weight proportion of 1:1 might be sufficient.

Balancing can be used effectively to reduce the number of records instead of analysis weight, which could reduce the time needed to train for both the Decision List & Cox Regression Model Development.

The time required for **Model Scoring** Churn Prediction Model Scoring.str can be improved by having intermediate tables from which the data can be loaded. Subsequent sections of the stream can read the data for scoring. This can be used to have SQL pushback features increase the speed of the stream overall by distributing a significant portion of the workload to the database.

Splitting the data for scoring purposes into multiple divisions and running the streams in parallel can help improve the performance.

## Loading data and starting the predictive analytics job

After the Analytics Platform is installed, you must configure and run the data load process and start the predictive analytics job. This is required for churn and NPS predictive analytics.

### Before you begin

Ensure that the following conditions are met:

- The Analytics Platform is installed.
- You have a user ID that has access to the IBM InfoSphere® BigInsights® database that is on the Analytics Platform node.
- IBM InfoSphere BigInsights is running.
- The IBM DB2 database exists on the data node.

### About this task

The runDBExport.sh script extracts data from the IBM InfoSphere BigInsights database on the Analytics Platform node and loads it into the IBM DB2 database on the data node. The script takes a parameter that runs the following variations of the script:

#### **runDBExport.sh nps**

Extracts and loads the nps data.

#### **runDBExport.sh churn**

Extracts and loads the churn data.

The following table lists the parameters in the config.properties file that you must configure:

*Table 1. Parameters in the config.properties file*

Parameter	Description	Default value
HiveHost	Change the hive host and port number	localhost:10000/default
HiveUser	Hive user name	hive

Table 1. Parameters in the config.properties file (continued)

Parameter	Description	Default value
HivePasswd	Hive user password	No default value.
DB2Host	DB2 Host and DB2 port number	localhost:50000
DB2User	DB2 user name	db2inst1
DB2Passwd	DB2 user password	No default value.
SqoopHost	Change the Sqoop host address and sqoop port number	localhost:12000/sqoop
HiveDataDirectory	Location of the Hive warehouse directory on the Analytics Platform node	/apps/hive/warehouse/tnf.db  The hive data directory can be determined by running the desc formatted <i>&lt;table name&gt;</i> command on a hive table and checking the location value. Enter the location after the port number.
SPSSEndPoint	URL of the IBM Predictive Customer Intelligence job. Update the host address.	http://localhost:9080/process/services/ProcessManagement
SPSSID	Job ID of SPSS. The OBJECT URI of the job to be started. The value can be determined by right-clicking the job in Deployment Manager and selecting properties.	No default value.
SPSSUser	SPSS CADS User ID. Used to log in to the Deployment Manager.	admin
SPSSPasswd	SPSS CADS Password.	No default value.

Add in Hadoop Port default 8020. You can determine your hive data directory by running the desc formatted *<table name>* command on a hive table and checking the location value. Enter the same port number that appears in the location field.

After you have updated the password, you must apply Base-64 encoding.

### Base-64 encoding of Sqoop configuration files

To Base-64 encode the passwords in each config.properties file, run the following command:

```
script/encodePasswordProperties.sh -f conf/<config_file_name>.properties
```

All plain-text passwords in the configuration file will be encoded. If you need to update a password, you can change the password property in the configuration file to its plain-text equivalent and re-encode just that property. To do this, pass the property name with the -p flag. For example, you could run the following:

```
script/encodePasswordProperties.sh -f conf/<config_file_name>.properties -p <SPSSPasswd>
```

This script must be run on a configuration file prior to running runDBExport.sh, or the decoded plain-text passwords will be invalid and the operation will fail.

### Procedure

1. Log on to the Analytics Platform node.
2. Change directory to /opt/IBM/IS\_CSP\_Customer\_Insight\_1.0.4.

3. Decompress the CSP\_CustomerInsight\_DB folder.
4. Copy the following files to the *SqoopHomeDir/lib* and *HiveHomeDir/lib* folders:
  - db2jcc.jar
  - db2jcc\_licence\_cu.jar
5. Open the config.properties file and change the parameters to refer to IBM InfoSphere BigInsights and the IBM DB2 database. Refer to the table in *About this task* for information about the parameters to change.

**Note:** There are two configuration files in /opt/IBM/IS\_CSP\_CustomerInsight\_1.0.4/CSP\_CustomerInsight\_DB/conf: churn\_config.properties and nps\_config.properties.

6. Enter the following commands:

```
chmod 755 runDBExport.sh
chmod 755 script/sqoop.sh
```

### **Configuring the sample Cognos icon service (optional)**

The Cognos Dashboards icon service allows Cognos Analytics to access images and other graphical objects.

Cognos Analytics does not allow dashboards to access such objects using file:// schemes; resources must be accessed over https://. This service provides https:// access.

The service is implemented as a Python SimpleHTTPService. It provides a small set of images in PNG and SVG format that can be added. Restart the service after adding or updating images.

To run the service, run the following:

```
./ctl.sh start
```

To stop the service, run the following:

```
./ctl.sh stop
```

Only an Analytics Platform administrative user can execute these commands. By default, the service listens on port 4333. The ctrl.sh script can be edited to listen on a different port. The arguments that can be supplied to IconService.sh are as follows:

```
-p postNo -s certificatePath
```



---

## Chapter 3. Using Customer Insight for Communication Service Providers

This section describes a typical user case that shows how to use the Customer Insight for Communication Service Providers solution to understand customer experience trends.

IBM Customer Insight for Communication Service Providers is composed of three separate components:

- a net promoter score (NPS) correlation application
- a churn management application
- a customer behavior dataset

The NPS correlation and churn management applications include an IBM Cognos user interface, which are described in the workflow procedures.

The churn management application provides an analysis of subscriber data suggesting how likely and when a customer is likely to churn, as well predicting the factors that influence churn.

The customer behavior dataset provides the following:

- a set of tables customers can access
- an accompanying data dictionary

The dataset contains subscribers' usage data, including their interests and preferences. The application analyzes the amount of time subscribers spend browsing, searching, reading, and streaming information on their devices. Each period of activity is categorized, where possible, into one of hundreds of interest categories, enabling communication service providers to categorize their subscribers into hundreds of different micro-segments based upon these interests.

### Workflow and user roles

This workflow shows how the NPS correlation application provides a dashboard and key metrics to a communication service provider. For this example, a customer experience team member investigates the NPS score for mobile data. A typical process workflow is described.

The workflow also provides a set of key metrics demonstrating the churn management application. For this example, the likelihood of a subscriber's churn propensity is associated with their churn propensity score. This functionality gives communication service providers (CSPs) the ability to identify customers who are likely to churn and also those of greatest value to the CSP. It also provides the ability to predict the factors influencing churn using the top rulesets and subscriber trend data. A typical process workflow is described.

---

### Using the NPS correlation application

The Customer Insight for Communication Service Providers solution provides in-depth analytics to help communication service providers evaluate key subscriber metrics.

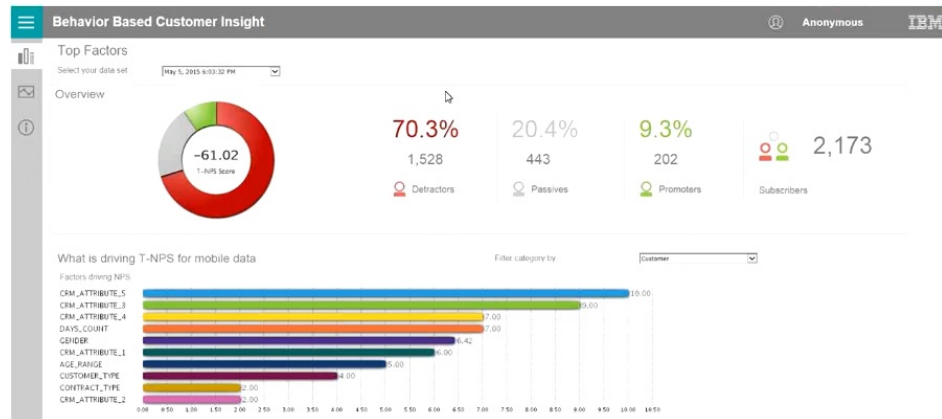
## About this task

This task describes how a typical customer experience team member would use the reports to investigate net promoter score (NPS) and transactional-NPS. The data is linked to the actual activity of subscribers. Subscriber data such as services, devices, or location are linked to their NPS, providing an enhanced view of the network and services.

The screen shots shown are for example purposes and will vary depending on your particular implementation.

## Procedure


1. Open the **Behavior Based Customer Insight Top Factors** report.

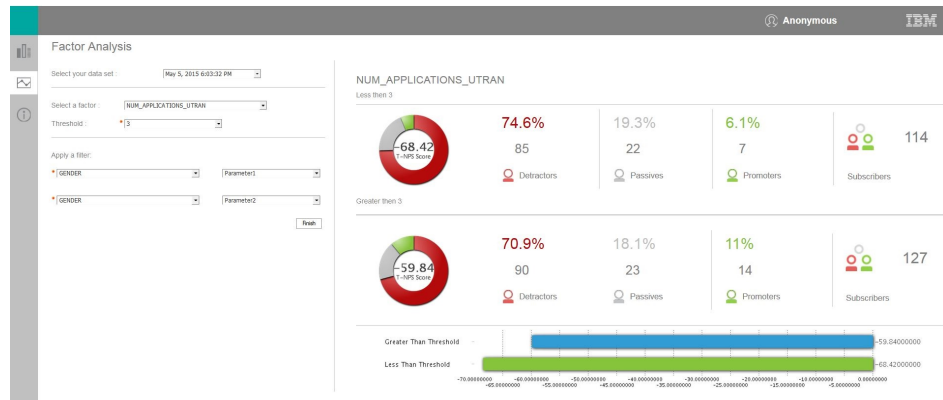


The T-NPS score of -61.02 indicates a high number of unhappy subscribers. This number reflects promoters (approximately 9%) minus detractors (approximately 70%). Factors driving the NPS data are summarized in the bar chart and legend.

2. Filter the data category based on **Data Activity**. The top 10 factors change to reflect the **Data Activity** category. The number of applications used on the UTRAN (3G) network is the most significant.

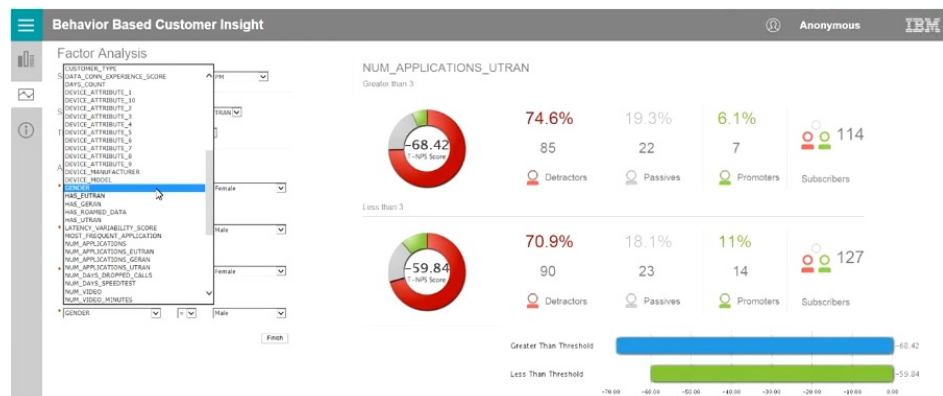


- Click the Factor Analysis icon  to launch the **Factor Analysis** page for NUM\_APPLICATIONS\_UTRAN.



With the Factor Analysis threshold set at 3, subscribers who are running more than three applications on UTRAN (a 3G network) have much lower NPS scores than those who are using three or less. With a similar number of subscribers, this analysis is statistically significant. The customer experience team can then use this as a means of further investigation.

- Apply further filters to the analysis, setting the data to show only female customers.



With this filter applied, the analysis shows an even greater difference between females who use more than three applications on 3G versus females who use three applications or less on 3G. A customer experience team member might then use this information for further investigation. For example, what type of applications were involved in creating this apparent negative experience for the subscribers in question?

## Using the churn management application

The churn management application utilizes standard churn management inputs, as well as voice, SMS, and mobile data records, to analyze trends in subscriber voice, SMS, and mobile data and to provide an interpretation of the churn model.

### About this task

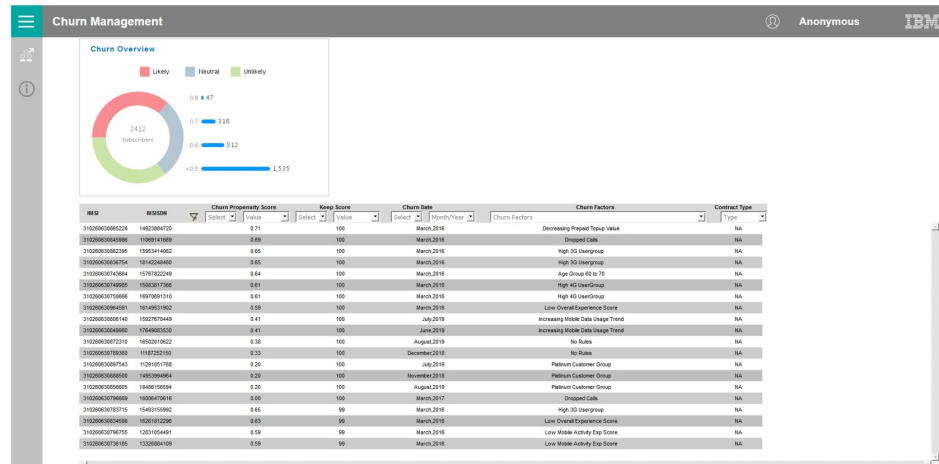
This task describes how a typical customer experience team member would use the reports to investigate a set of subscribers and evaluate their likelihood to churn

based on their churn propensity and other factors. It also describes the ability to predict the factors influencing churn using the top rulesets and subscriber trend data

The screen shots shown are for example purposes and will vary depending on your particular implementation.

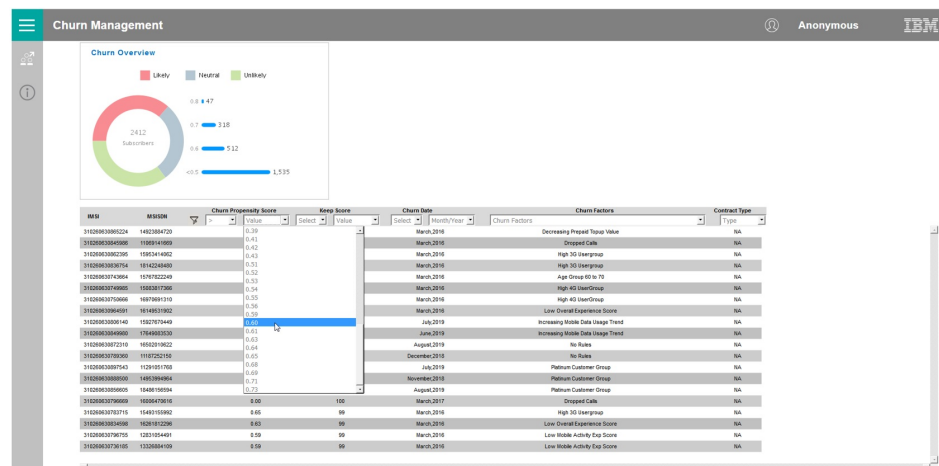
## Procedure

1. Open the **Churn Management Overview** report.

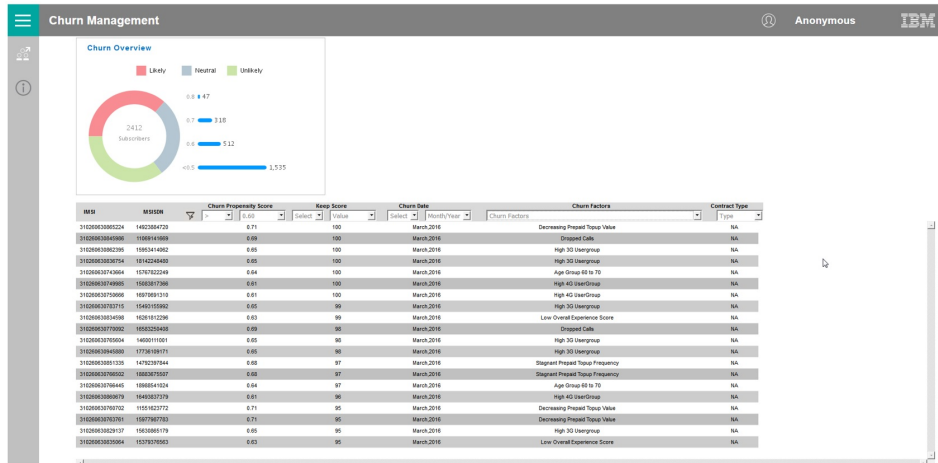


The main report page shows an overview of the entire subscriber base in the donut chart. Of the 2412 subscribers, 877 are likely to churn based on their churn propensity of  $\geq 0.6$ . The default report is sorted first by **Keep Score** and then **Churn Propensity Score** (both descending). This highlights to communication service providers (CSPs) those subscribers who are the greatest value, as well as those who are most likely to churn.

2. Using the pull-down menus on the report, select the greater than sign ( $>$ ) and then select a value of **0.60**.



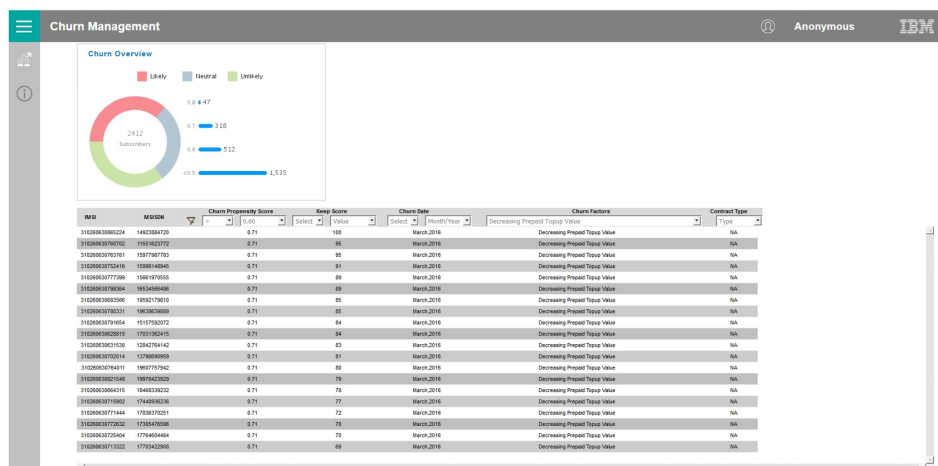
This filters the subscribers in the **Churn Propensity Score** column to include only those with a score greater than 0.60.



Four other factors are available for filtering:


- **Keep Score:** Filters by relative subscriber importance. For example, this factor would allow a customer experience team member to concentrate on those subscribers with a score greater than 50.
- **Churn Date:** Provides a projected churn date. For example, this filter would allow a customer experience team member to concentrate on those likely to churn sooner rather than later.
- **Churn Factor:** Provides a suggested churn factor. This filter would allow a customer experience team member to segment based on specific factors impacting subscriber satisfaction, including offers which might be available to likely churners (such as **Decreasing Prepaid Top Value**).
- **Contract Type:** Filters by the type of subscribers. For example, this filter would allow a customer experience team member to segment based on **Prepay** or **Postpay** subscribers, which may be assigned to different departments.

3. Click the **Churn Factors** pull-down menu, and select **Decreasing Prepaid Top Value**.



With this filter applied, subscribers are listed whose predominant reason for churn is the decreasing value of their monthly top-up, ranked in descending order by **Keep Score** and **Churn Propensity Score**. In this example, there are

several very valuable subscribers who are likely to churn by March 2016. These are the subscribers who the CSP would most likely address when attempting to stop subscribers from churning.

- Click  to view the **Churn Management Rulesets** report.



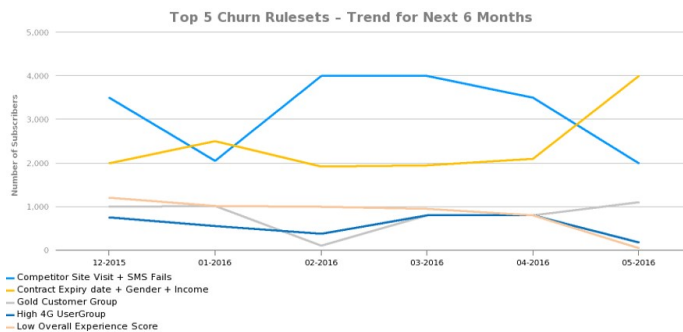
This report contains three report panes:

- **Top 10 Churn Results -- Overall**



This pane highlights the top ten rulesets for a specific execution of churn management data. The rulesets are weighted by relevance. This highlights the primary issues contributing to predicted customer churns.

- **Top 5 Churn Rulesets – Trend for Next 6 Months**



This pane highlights the top five rulesets for a specific execution of churn management data, and predicts the trend of influence for those rulesets for the next six months. This can highlight rising trends in a particular sets of circumstances (such as expiring contracts), which may impact churn rates in the near future.

- **Top 5 Churn Rulesets – Summary for Next 6 Months**

### Top 5 Churn Rulesets – Summary for Next 6 Months

% = Percent of Overall Churn for Next 6 Months  
# = Number of Expected Churning Subscribers for Next 6 Months



This pane highlights the top five rulesets for a specific execution of churn management data, and provides an overview of how those rulesets may influence churn over the next six months. The donut charts summarize the predicted percentage of churn contribution and also the estimated number of affected subscribers.

---

## Using the over-the-top application

The over-the-top (OTT) application delivers pre-built out-of-the-box dashboards. Communication Service Providers can quickly visualize changing trends in how customers are using devices and applications

### About this task

This task describes how a typical customer experience team member would use the OTT dashboards

The screen shots shown are for example purposes and will vary depending on your particular implementation.

### Procedure

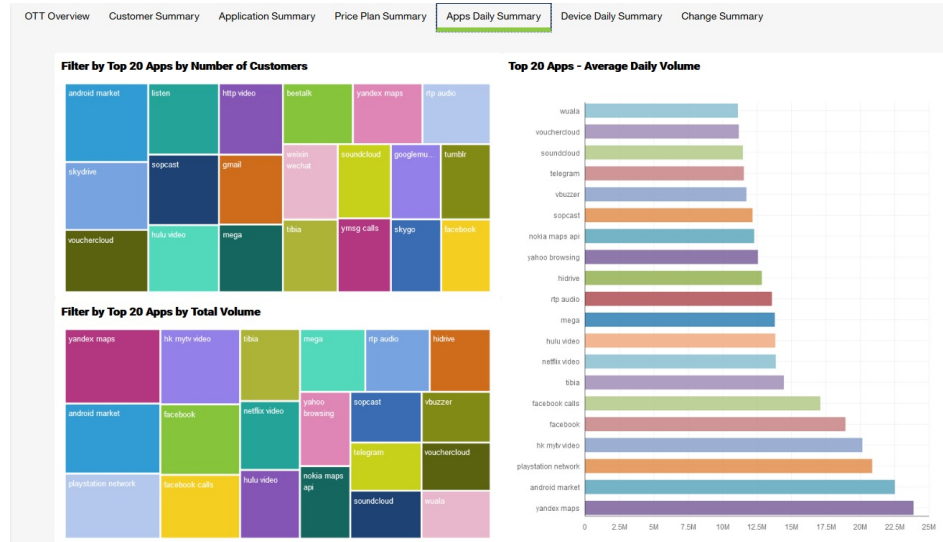
1. Open the **Over the Top Application** dashboard. The first dashboard is the OTT overview. This dashboard shows the **Fastest Growing OTT Apps by Volume**







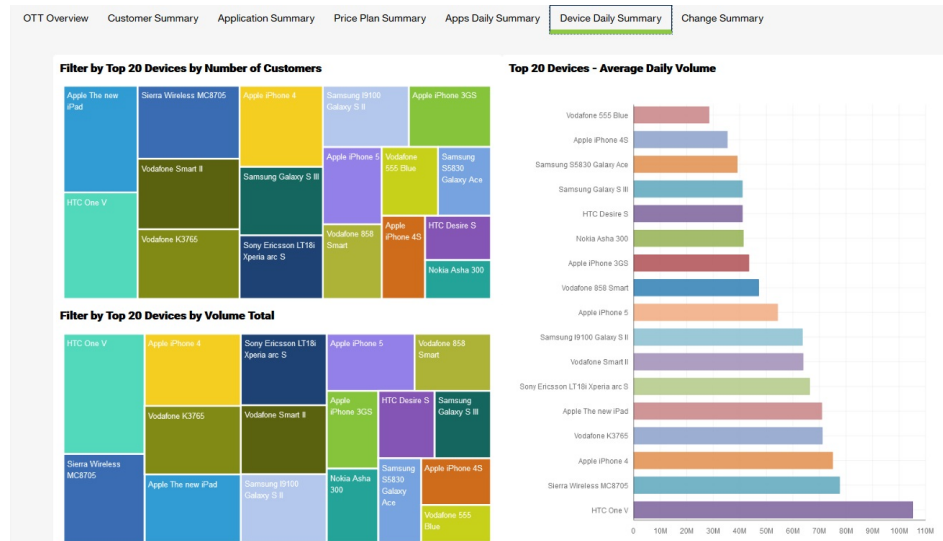
## Volume.



This dashboard graphically illustrates the following information:

- top 20 applications by number of customers
- top 20 applications by total volume
- top 20 applications by average daily volume

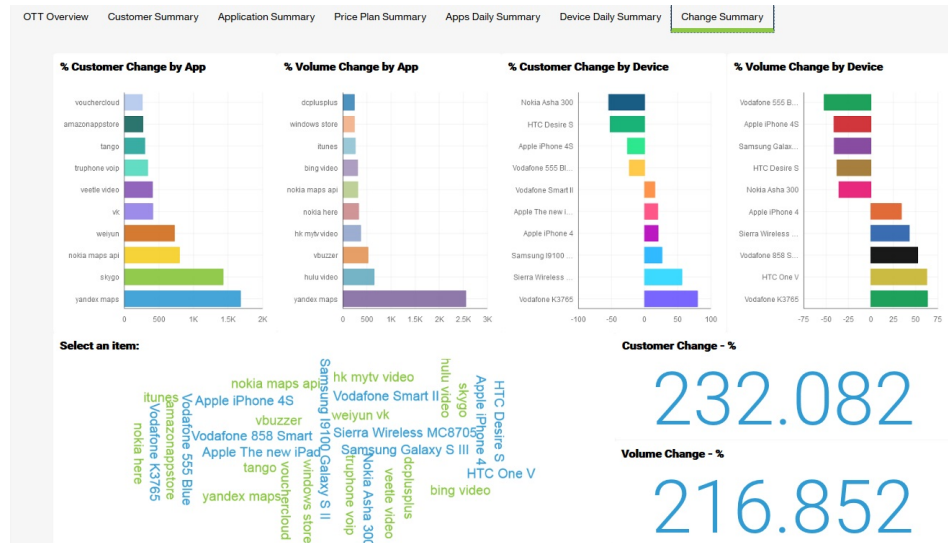
6. Click the **Device Daily Summary** tab to view the **Top 20 Devices by Number of Customers**, **Top 20 Devices by Volume Total**, and **Top 20 Devices - Average Daily Volume**.



This dashboard graphically illustrates the following information:

- top 20 devices by number of customers
- top 20 devices by total volume
- top 20 devices by average daily volume

- Click the **Change Summary** tab to view the apps and devices changing by volume and customers.



This dashboard graphically illustrates the following information:

- percentage customer change by application: filterable by device
- percentage volume change by application: filterable by device
- percentage customer change by device: filterable by application
- percentage volume change by device: filterable by application

## Using the profile application

The user profile application helps Communication Service Providers to view the type of customer profiles using their network.

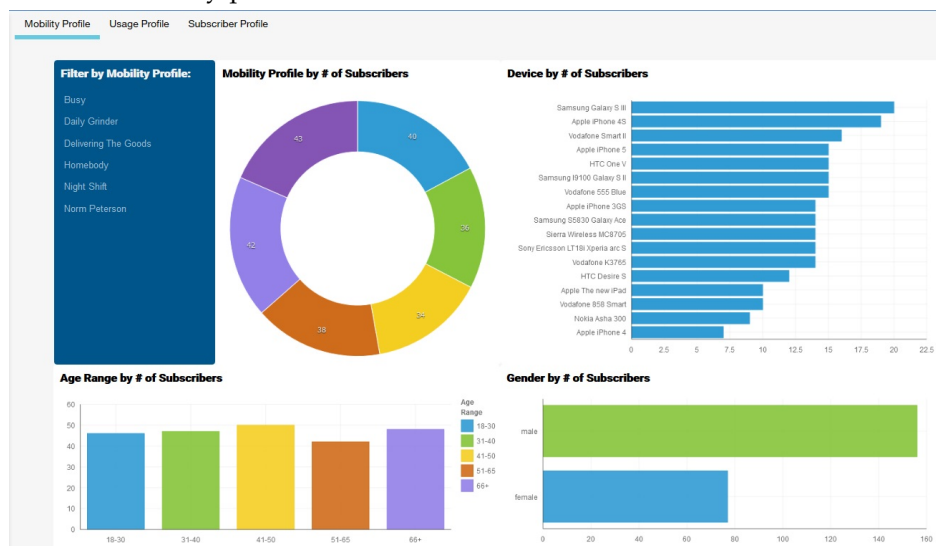
### About this task

This task describes how a typical customer experience team member would use the Profile dashboards

The screen shots shown are for example purposes and will vary depending on your particular implementation.

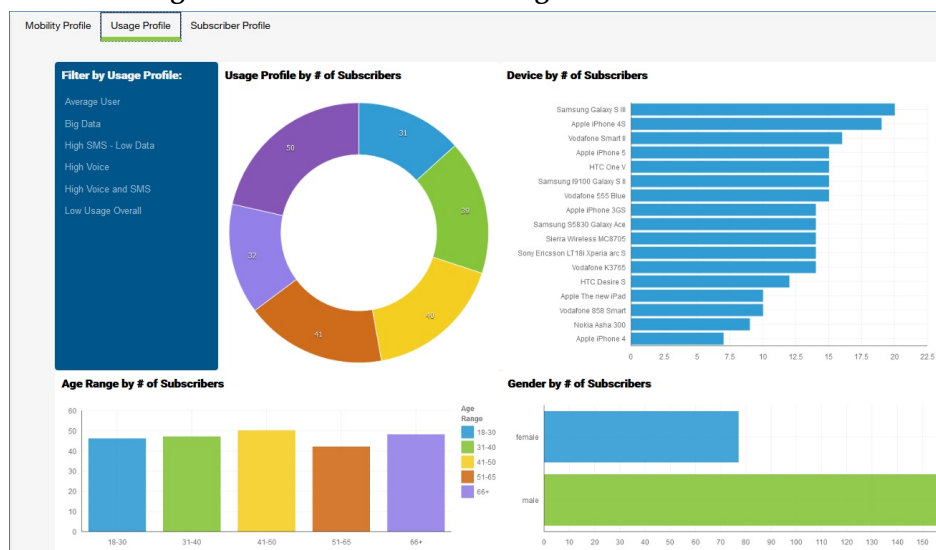
## Procedure

1. Open the **Mobile Profile** dashboard. This dashboard provides the ability to view the mobility profiles of all customers.



This dashboard graphically illustrates the following information:

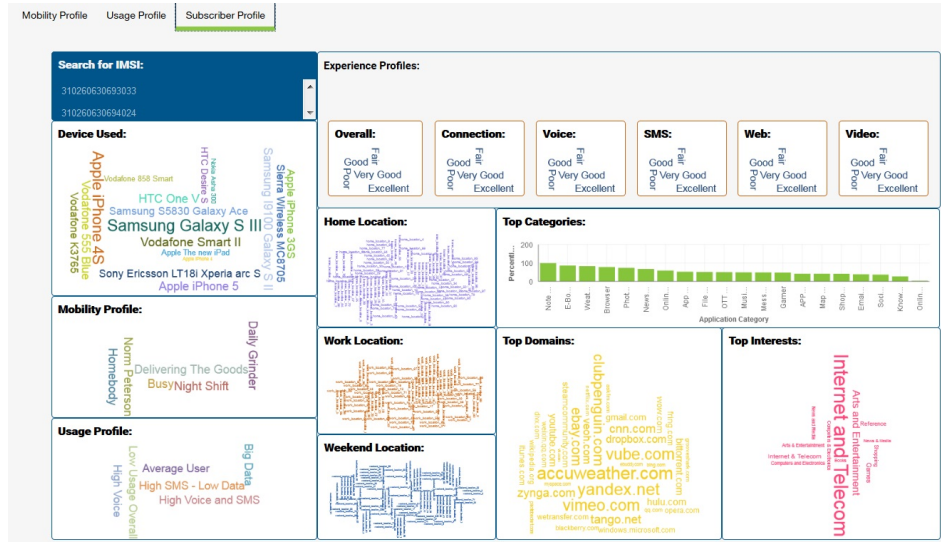
- **Mobility Profile by # of Subscribers:** filterable by device, gender, and age range
  - **Device by # of Subscribers:** filterable by mobility profile, age, and gender
  - **Age Range by # of Subscribers:** filterable by mobility profile, gender, and device
  - **Gender by # of Subscribers:** filterable by mobility profile, age, and device
2. Click the **Usage Profile** tab to view the **Usage Profile** dashboard.



This dashboard graphically illustrates the following information:

- **Usage Profile by # of Subscribers:** filterable by device, gender, and age range
- **Device by # of Subscribers:** filterable by usage profile, age, and gender
- **Age Range by # of Subscribers:** filterable by usage profile, gender, and device
- **Gender by # of Subscribers:** filterable by usage profile, age, and device

3. Click the **Subscriber Profile** tab to view metrics for an individual customer.



This dashboard can be filtered by IMSI and graphically illustrates the following information:

**Note:** All fields can be used as filters.

- **Device Used**
- **Mobility Profile**
- **Usage Profile**
- **Experience Profiles**
- **Home Location**
- **Work Location**
- **Weekend Location**
- **Top Categories**
- **Top Domains**
- **Top Interests**



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## Appendix A. Accessibility features

Accessibility features help users who have a physical disability, such as restricted mobility or limited vision, to use information technology products.

For information about the commitment that IBM has to accessibility, see the IBM Accessibility Center ([www.ibm.com/able](http://www.ibm.com/able)).

IBM Cognos HTML documentation has accessibility features. PDF documents are supplemental and, as such, include no added accessibility features.

### Report output

In IBM Cognos Administration, you can enable system-wide settings to create accessible report output. For more information, see the *IBM Cognos Analytics Administration and Security Guide*. In IBM Cognos Report Studio, you can enable settings to create accessible output for individual reports. For more information, see the *IBM Cognos Report Studio User Guide*. You can access the previously mentioned documents at IBM Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).





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## Appendix B. The data provision tool

The data provision tool loads, deletes, and exports data from the provision tables. The provision tables contain customer relationship management data.

The data provision tool is installed in the `/opt/tnf/apps/bis-main-var/bis-provisioning-tool` folder and consists of the following parts:

### **load.sh**

Loads and updates provision tables.

### **load-all.sh**

Checks all the files in the `.csv` folder and loads them at the same time.

### **delete.sh**

Reads records from input files and deletes records from IBM InfoSphere BigInsights by using key values.

### **export.sh**

Exports records from IBM InfoSphere BigInsights to text files.

## **Usage**

You must specify key values for all operations. The key field names are obtained by the provision tools from the table metadata. The primary key must be defined in table DDL. In the following examples the primary key field is **tac**:

```
create table device (  
tac varchar(32) primary key, model varchar(64),  
vendor varchar (64)  
);
```

The follow example contains two primary keys:

```
create table device (  
tac varchar(32),  
model varchar(64), vendor varchar (64), primary key (tac, model)  
);
```

To see the parameters for `load.sh` type, the script name with no parameters in a command-line window:

```
Usage: load.sh [options] Options:  
* --file, -f  
CSV file with data * --table, -t  
DB Table name
```

### **--file, -f**

A list of input files that are separated by the pipe (`|`) character.

### **--table, -t**

The table name. The table name can include a dot separated schema. For example, `load.sh -f device.csv -t device`.

`delete.sh` and `export.sh` take the same parameters.

The data provision tool reads table metadata and converts the input text file into an Apache Parquet or plain text formatted file and populates specified table with the data. It updates existing records and inserts new records.

## Creating dictionary tables

Run the `/opt/tnf/apps/bis-main/bis-dbconfig/install-db.sh` script with table group name parameters. The script `/opt/tnf/apps/bis-main/bis-main.sh` creates a dictionary table in the database when it starts.

You cannot modify the data in IBM InfoSphere BigInsights directly. The data provision tool updates the database tables and exports them to IBM InfoSphere BigInsights. During the export stage, the data provision tool must know the storage format. Apache Parquet and plain text formats are supported. Update the storage format in the `/opt/tnf/apps/bis-main/bis-tools/bisprovisioning-tool/cfg/hive-storage.properties` file.

## Input files

The data input format is a pipe (|) separated utf-8 encoded plain text file with headers. The header can start with a number sign (#). Header values must match the dictionary table case insensitive field names. For example,

```
TAC|MODEL|VENDOR  
12345678|Zamyang|Ciaobao
```

---

## Appendix C. Accessing the SLM log file

To determine the number of customers in the database, refer to the SLM log file.

The xml files for SLM tagging are generated in the /opt/slm/\*.slmtag folder. Information is added until the log file reaches a certain size; then a new log file is created.

### Output file location

```
/opt/tnf/apps/ci-slm/log  
42ca60df8d764911842164c041bf7c8b.slmtag
```

### Format of the output

```
<SchemaVersion>2.1.1</SchemaVersion>  
<SoftwareIdentity>  
  <PersistentId>42ca60df8d764911842164c041bf7c8b</PersistentId>  
  <Name>IBM Customer Insights for Communications Service Providers</Name>  
  <InstanceId>/opt/tnf/apps/ci-slm</InstanceId>  
</SoftwareIdentity>  
<Metric logTime="2016-07-20T00:01:06+01:00">  
  <Type>RESOURCE_VALUE_UNIT</Type>  
  <SubType>SUBSCRIBER</SubType>  
  <Value>250000</Value>  
  <Period>  
    <StartTime>2016-07-19T00:01:06+01:00</StartTime>  
    <EndTime>2016-07-20T00:01:06+01:00</EndTime>  
  </Period>  
</Metric>  
<Metric logTime="2016-07-21T00:01:03+01:00">  
  <Type>RESOURCE_VALUE_UNIT</Type>  
  <SubType>SUBSCRIBER</SubType>  
  <Value>250000</Value>  
  <Period>  
    <StartTime>2016-07-20T00:01:02+01:00</StartTime>  
    <EndTime>2016-07-21T00:01:02+01:00</EndTime>  
  </Period>  
</Metric>
```



---

## Appendix D. Troubleshooting

This section contains troubleshooting information for the Customer Insight for Communication Service Providers installation.

---

### Troubleshooting a problem

Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem.

Review the following table to help you or customer support resolve a problem.

*Table 2. Troubleshooting actions and descriptions*

Actions	Description
A product fix might be available to resolve your problem.	Apply all known fix packs, or service levels, or program temporary fixes (PTF).
Look up error messages by selecting the product from the IBM Support Portal, and then typing the error message code into the <b>Search support</b> box ( <a href="http://www.ibm.com/support/entry/portal/">http://www.ibm.com/support/entry/portal/</a> ).	Error messages give important information to help you identify the component that is causing the problem.
Reproduce the problem to ensure that it is not just a simple error.	If samples are available with the product, you might try to reproduce the problem by using the sample data.
Ensure that the installation successfully finished.	The installation location must contain the appropriate file structure and the file permissions. For example, if the product requires write access to log files, ensure that the directory has the correct permission.
Review all relevant documentation, including release notes, technotes, and proven practices documentation.	Search the IBM Knowledge Center to determine whether your problem is known, has a workaround, or if it is already resolved and documented.
Review recent changes in your computing environment.	Sometimes installing new software might cause compatibility issues.

If the items in the table did not guide you to a resolution, you might need to collect diagnostic data. This data is necessary for an IBM technical-support representative to effectively troubleshoot and assist you in resolving the problem.

### Troubleshooting resources

Troubleshooting resources are sources of information that can help you resolve a problem that you are having with an IBM product.

#### Support Portal

The IBM Support Portal is a unified, centralized view of all technical support tools and information for all IBM systems, software, and services.

The IBM Support Portal lets you access all the IBM support resources from one place. You can tailor the pages to focus on the information and resources that you need for problem prevention and faster problem resolution. Familiarize yourself with the IBM Support Portal by viewing the demo videos ([https://www.ibm.com/blogs/SPNA/entry/the\\_ibm\\_support\\_portal\\_videos](https://www.ibm.com/blogs/SPNA/entry/the_ibm_support_portal_videos)).

Find the content that you need by selecting your products from the IBM Support Portal (<http://www.ibm.com/support/entry/portal>).

Before contacting IBM Support, you will need to collect diagnostic data (system information, symptoms, log files, traces, and so on) that is required to resolve a problem. Gathering this information will help to familiarize you with the troubleshooting process and save you time.

## **Service request**

Service requests are also known as Problem Management Reports (PMRs). Several methods exist to submit diagnostic information to IBM Software Technical Support.

To open a PMR or to exchange information with technical support, view the IBM Software Support Exchanging information with Technical Support page (<http://www.ibm.com/software/support/exchangeinfo.html>).

## **Fix Central**

Fix Central provides fixes and updates for your system's software, hardware, and operating system.

Use the pull-down menu to navigate to your product fixes on Fix Central (<http://www.ibm.com/systems/support/fixes/en/fixcentral/help/getstarted.html>). You may also want to view Fix Central help.

## **IBM developerWorks®**

IBM developerWorks provides verified technical information in specific technology environments.

As a troubleshooting resource, developerWorks provides easy access to the most popular practices, in addition to videos and other information: developerWorks (<http://www.ibm.com/developerworks>).

## **IBM Redbooks®**

IBM Redbooks are developed and published by the IBM International Technical Support Organization, the ITSO.

IBM Redbooks (<http://www.redbooks.ibm.com>) provide in-depth guidance about such topics as installation and configuration and solution implementation.

## **Software support and RSS feeds**

IBM Software Support RSS feeds are a quick, easy, and lightweight format for monitoring new content added to websites.

After you download an RSS reader or browser plug-in, you can subscribe to IBM product feeds at IBM Software Support RSS feeds (<https://www.ibm.com/software/support/rss>).

## Log files

Log files can help you troubleshoot problems by recording the activities that take place when you work with a product.

## Error messages

The first indication of a problem is often an error message. Error messages contain information that can be helpful in determining the cause of a problem.

## Troubleshooting known data provision tool error messages

There are solutions for known data provision tool error messages that you may encounter in IBM Customer Insight for Communication Service Providers.

*Table 3. Solutions to known data provision tool error messages in IBM Customer Insight for Communication Service Providers.*

Error message	Action
<p><b>Permission denied.</b></p> <p>This error is a permission denied error with one of the following two messages:</p> <ol style="list-style-type: none"> <li>1. java.io.IOException. Cannot run program "runDBExport.sh": error=13, Permission denied.</li> <li>2. java.io.IOException. Cannot run program "script/sqoop.sh": error=13, Permission denied.</li> </ol>	<p>Investigate the DBExport.log to search for the error.</p> <ol style="list-style-type: none"> <li>1. Check the permission of runDBExport.sh. Refer to the setup documentation for the appropriate steps.</li> <li>2. Check the permission of sqoop.sh in the script folder in which the sqoop.sh resides. Refer to the setup documentation for the appropriate steps.</li> </ol>
<p><b>Sqoop job failure</b></p> <ol style="list-style-type: none"> <li>1. IOException [main] LoadDB2 ERROR - java.io.IOException: Can't export data, please check task tracker logs. ERROR tool.ExportTool: Error during export: Export job failed!</li> <li>2. IllegalArgumentException. [main] LoadDB2 ERROR - Caused by: java.lang.IllegalArgumentException: Timestamp format must be yyyy-mm-dd hh:mm:ss[.fffffffff]</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify whether the hive data from the nps_score_table (if it's option 1) or the nps_score_table_latest (if it's option 2) contains the new line character (\n) at the EOF. <b>Tip:</b> The location of the hive data is specified by the HiveDataDirectory located in the config.properties file.</li> <li>2. Verify whether the hive data from the nps_score_table (if it's option 1) or the nps_score_table_latest (if it's option 2) contains valid data in the field mentioned by the value of HiveDataDirectory located in the config.properties file.</li> </ol>
<p><b>SPSS job error</b></p> <p>ERROR - Exception !!!</p> <p>java.io.IOException: Server returned HTTP response code: 500 for URL: http://&lt;SPSSHost&gt;:&lt;port&gt;/process/services/ProcessManagement</p>	<p>Verify whether SPSS is running and the correct host name and port number have been used.</p>

## Troubleshooting SPSS

If your SPSS job fails, there are some troubleshooting steps you can follow to resolve the issue.

### Procedure

1. Right-click on the **Load Report Tables** job in the **Jobs** folder of CSP\_CustomerInsights\_NPS.
2. Click **Show Job History**. This will display information about the job runs, their logs, and their status.
3. Select the job that has failed. The job will have three individual SPSS streams. Select the one which has failed.
4. Open the log associated with the failed stream.
5. Scroll to the end of the job to discover the reason the job failed.

### Results

Common reasons for the job to fail include the unavailability of resources such as:

- Database
- Memory
- Any of the prerequisite services such as SPSS Modeler Server and CADS

## After the Solution Installer is run, Chef processes are still running after the cleanup.sh script is executed

After the cleanup.sh script is run on the Solution Installer node, all Chef processes should be terminated. However, in some cases Chef processes are still running.

If you try to run the Solution Installer setup.sh file again, you might receive a message that required ports are in use, or creation of the Chef user might fail.

The solution to this issue is to reboot the installation node after you run the "cleanup.sh" script.

**Note:** This information applies only to the Solution Installer node and not the client/target nodes.

**Attention:** The Solution Installer runs on the latest versions of Chrome and Firefox. It is not tested on Safari and does not run on Internet Explorer.



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# Index

## A

accessibility 41  
Analytics Platform 11

## C

Churn Management application 29  
churn prediction 23  
Collaboration and Deployment Services Deployment Manager 18, 22  
configuration 5  
    modifying sudoers file 8  
configuration files  
    db2\_connection.properties 43  
customer relationship data 43

## D

dashboard 16  
data load 24  
data provision tables  
    loading 43  
data provision tool 43  
    troubleshooting 49  
data source connection  
    ODBC 18  
    TELCO database 15  
database  
    DB2 15  
    TELCO 15  
Dataset cronjobs 17  
datasets 12  
Deployment Manager 18, 22

## F

firewall settings 9  
    configure with script 9  
    disabling 9  
firewall.sh 9

## I

IBM SPSS 18, 23, 24  
    churn factors 22  
    model performance 23  
    sequencing 22  
    triggering 22  
installation 5  
    DB2 15  
    deploying installation files 11  
    modifying sudoers file 8  
    overview 5  
    TELCO database 15

## J

job  
    configuring 18  
    starting 24

## M

master node 8, 11, 17  
Mediation node 11

## N

nodes  
    Business Intelligence node 14  
    requirements 11  
NPS correlation application 28

## O

Over-the-top application 33

## P

package  
    contents 5  
Profile application 37

## S

Sample configuration 26  
servers  
    *See* nodes  
SLM log 45  
SLM tag 45  
solution  
    overview 1  
    topology 5  
solution content 11  
solution datasets 12  
Solution Installer 7, 8  
SPSS job triggering 17  
sudoers file 8

## T

troubleshooting 47  
    cleanup.sh 50  
    data provision tool 49  
    resources 47

## V

veda component 11