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Release 4.0

BroadWorks Dashboards and Discovery

Installation and Configuration Guide

Version 4.0
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This document is printed in the United States of America.

Document Revision History

Version	Date	Author	Comments
1.0	<i>September 2016</i>	DES	Created document
2.0	<i>March 2017</i>	HIK	Version Upgrade
3.0	<i>December 2017</i>	BCH	Version Upgrade
4.0	<i>February 2018</i>	PAG	Release 4.0 Update
4.0.3	<i>May 2018</i>	BCH	Updates for 4.0.3
4.0.4	<i>June 2018</i>	BCH	Updates for 4.0.4

Preface

The *BroadWorks Dashboards and Discovery Guide* contains instructions to install and configure Elasticsearch and Kibana along with BroadWorks Dashboards and Discovery toolset .

Assumptions

This guide assumes familiarity with the OS environment. It also assumes that your server specifications meet the minimum requirements outlined in Host Requirements.

Documentation Suite

The *BroadWorks Dashboards and Discovery* software suite includes the following technical documentation.

Document Title	Description
BroadWorks Dashboards and Discovery -Kibana Dashboards Installation	Provides information Kibana Dashboards Installation
BroadWorks Dashboards and Discovery	Provides information on deploying the software on system.
BroadWorks Dashboards and Discovery Kibana Plugins	Overview of Kibana BroadWorks Dashboards and Discovery application.

Acronym List

The following terms have been used in this guide:

Acronym	Definition
BDD	Broadworks Discovery and Dashboard
XSI	Xtended Services Interface
Xsp	Xtended Services Platform
XS	Execution Server

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1 Overview

The BroadWorks Dashboards and Discovery toolset is a set of tools that collect BroadWorks logs and CDR data and allow analysis and visualization of data. They utilize Elasticsearch as the backend storage technology and Kibana as the Discovery/Visualization and Dashboarding frontend. Also included is custom Kibana plugins for providing BroadWorks specific visualization of SIP and Xsi Event flows.

The toolset includes (more detail in following sections):

- BroadWorks Log Collectors
- Broadworks XML/CSV CDR Collector
- BroadWorks Radius CDR Collector
- BroadWorks Subscriber Dump Processor
- Broadworks Message Archive Processor
- Sample Kibana Visualizations/Dashboards
- Script based samples of offboard data collection

2 Support

2.1 Elasticsearch, Kibana, and Kafka

Elasticsearch, Kibana, and Kafka (optionally) are requirements of the BroadWorks Dashboards and Discovery but are not delivered or supported by BroadSoft. If maintenance and support is required, it is recommended to get that from the Elasticsearch organization. Additionally, BroadSoft will provide guidance on configuration and installation but is beyond the scope of the what is being delivered.

2.2 BroadWorks Dashboards and Discovery

The BroadWorks Dashboards and Discovery toolset is being delivered as an open source project available from GitHub. Support will be provided through issue reporting on GitHub where BroadSoft will respond to questions/issues and product requests on a best effort basis. Issues can be opened from the same location on GitHub as this document was received and the toolset downloaded from. For reference the download location is:

<https://github.com/BroadSoft-Xtended/BroadWorks-Dashboards-and-Discovery>

To open an issue – navigate to the above page and go to the Issues tab then click “New Issue”

BroadSoft has a team that is supporting the toolset and will review the Issues reported and provide comments on resolution.

2.3 License

The BroadWorks Dashboards and Discovery toolset is being delivered under the Apache License, Version 2.0 – License is below:

```
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```


3 Elasticsearch, Kibana and Kafka

Elasticsearch is the backend storage for the data collected and is used for the searching and filtering of the data for analysis by the frontend applications. The applications are built using the ES rest client so is reportedly ES release agnostic. The current set of applications are built upon the following versions:

- Elasticsearch version 6.0.0
- Kibana version 6.0.0

Elasticsearch and Kibana can be downloaded from <https://www.elastic.co>

Optionally, Apache Kafka may be used as a resilient data streaming layer between the collectors and Elasticsearch.

- Apache Kafka version 1.0.0

Apache Kafka can be downloaded from <https://kafka.apache.org/downloads>

It is strongly recommended to review the documentation from the download sites for performance, configuration details, and other deployment recommendations.

3.1 Elasticsearch Installation

3.1.1 Requirements

The prerequisite require for installation is a dedicated server – with the desired memory and disk space (see section on Hard Guidance)

The simplest installation guidance of Elasticsearch on a server is provided below

- Download version 6.0.0 (.0.0.zip)
- Create a new user on the server named elastic
 - `useradd -m elastic`
 - `password elastic`
 - `<input desired password>`
- Login as elastic
- Unzip `elasticsearch-6.0.0.zip`

Elasticsearch is effectively installed. It is self-contained in its own directory.

3.1.2 Configuration Guidance

This section provides guidance on configuration of Elasticsearch. Please visit <https://www.elastic.co> for full configuration documentation that may be pertinent to your deployment.

File `elasticsearch-6.0.0/config/elasticsearch.yml`. This file holds the static configuration for Elasticsearch. The initial content of the file will be with no elements enabled (all at application default)

- `cluster.name` – This parameter defines the name of the Elasticsearch cluster. If you have multiple nodes with the same cluster name – they will auto-discover and join in the cluster automatically. Should be unique within your network if you have more than one cluster.
Example:
 - `cluster.name: broadworksdd`
- `network.host` – This defines the network interfaces that the Elasticsearch cluster will listen to for connections. If you intend to have a single ES node with all applications on the node then this does not need to be configured. But if you intend to connect from other nodes in your network – you need to define the interface for it to listen on.
- `bootstrap.mlockall` – Set to true for performance. It prevents ES memory from being swapped out.
- `index.refresh_interval` – This is the time interval between document indexing and the document being available for searching/available for analysis. The default is 1 second (1s) – the higher the index rate the more CPU cycles will be utilized merging the documents. This deployment is extremely heavy in indexing (100s of thousands a minute) – by extending the refresh interval – overall performance of the server will increase.

Example:

- `index.refresh_interval: 30s`
- `path.data` – This is the list of disks that the ES will store the documents and the indexes.
Example:
 - `path.data: /data/disk1, /data/disk2, /data/disk3, /data/disk4`
- `path.logs` – Directory ES will store its application logs. Example:
 - `path.logs: /home/elastic/elasticlogs`
- See more specific configurations, see:
 - <https://www.elastic.co/guide/en/elasticsearch/reference/current/setup.html>

File `elasticsearch-6.0.0/config/jvm.options`. This file holds the static configuration for Elasticsearch JVM heap setting. The initial content of the file will be with default settings.

- `-Xms2g` - Xms represents the initial size of total heap space
`-Xms16g`
- `-Xmx2g` - Xmx represents the maximum size of total heap space
`-Xmx16g`

Example startup script. Below is a sample startup script. The operator will need to create/configure the server startup to reference this in the rc.d scripts (based upon your deployment OS):

- `#!/bin/sh`
- `export JAVA_HOME=<path to java installation>`
- `/home/elastic/elasticsearch-6.0.0/bin/elasticsearch -d`

Note: The recommended ES configuration on a server is to give the ES heap no more than 50% of the RAM in the server. This allows the OS to manage the file cache which improves performance for the underlying indexing algorithms underlying Elasticsearch (see <https://lucene.apache.org/> for more information on that technology)

3.2.3 Elasticsearch X-Pack Security

Elasticsearch X-Pack Security is supported. In order to enable security, the X-Pack Elasticsearch plugin must be installed. If using ES prior to 6.3, see instructions at <https://www.elastic.co/guide/en/elasticsearch/reference/6.2/installing-xpack-es.html>.

All of the steps for installing security on Elasticsearch and Kibana are advised. Part of the process involves generating certificates for the Elasticsearch servers, which are signed by a certificate authority.

<https://www.elastic.co/guide/en/elasticsearch/reference/6.2/configuring-tls.html#node-certificates>

The BDD components depend on the certificate authority (CA) root certificate so that they can successfully connect to Elasticsearch with TLS 1.2.

The root certificate can be obtained from the PKCS12 encrypted container created by the Elasticsearch "certutil" tool:

```
bin/x-pack/certutil ca
```

The certutil tool produces a file "elastic-stack-ca.p12", which contains the CA certificate as well as the private key for the CA, which should be kept in a secure location and not used as is. The certificate can be extracted from the PKCS12 (without any private keys) container using the OpenSSL command:

```
openssl pkcs12 -in elastic-stack-ca.p12 -out cacert.pem -nokeys
```

This will ask for the password that was used to secure the PKCS12 container when it was created. Once the CA certificate is obtained, a Java truststore is created and the CA root certificate is added to it.

```
keytool -keystore client.truststore.jks -alias CARoot -import -file cacert.pem
```

Java "keytool" will ask for a password to secure the truststore file. It creates (or modifies) a truststore file "client.truststore.jks" that can be used by the BDD components.

3.2 Kibana

3.2.1 Requirements

Section assumes section 2.1 has been executed.

- Download Kibana version 6.0.0 (`kibana-6.0.0-linux-x64.tar.gz`)
- Login as elastic
- `tar -zxvf kibana-6.0.0-linux-x64.tar.gz`

Kibana is effectively installed. It is self-contained in its own directory.

3.2.2 Configuration Guidance

This section provides guidance on configuration of Kibana. Please visit <https://www.elastic.co> for full configuration documentation that may be pertinent to your deployment.

File `kibana-6.0.0-linux-x64/config/kibana.yml`. This file holds the static configuration for Elasticsearch. File contents will initially be commented out. Below is guidance on items of interest:

- `elasticsearch.url` – Defines the access to ES. If Kibana is running on a different server than the Kibana instance.
Example:
 - `elasticsearch.url: "https://10.10.10.10:9200"`
- `server.host` - Specifies the address to which the Kibana server will bind, IP address and hostname are both valid entries. If you want give access to all system in network.
Example
 - `server.host: 0.0.0.0`
- `elasticsearch.requestTimeout` – Defines the time before Kibana will timeout a request. It can sometimes take a bit for Kibana to heat up the cache on the first queries if the info being requested has been flushed to disk.
Example:
 - `elasticsearch.requestTimeout: 120000`

Example startup

- `Kibana-6.0.0-linux.x64 serve -Q &`
- It is recommended to use the same startup strategy for kibana as Elasticsearch. More information on Kibana configuration :
 - <https://www.elastic.co/guide/en/kibana/6.0/setup.html>

3.3 Kafka Installation

3.3.1 Requirements

The prerequisite require for installation is a dedicated server – with the desired memory and disk space (see section on Hard Guidance)

The simplest installation guidance of Kafka on a server is provided below

- Download version 1.0.0 (2.11-1.0.0.tgz)
- Create a new user on the server named kafka
 - `useradd -m kafka`
 - `password kafka`
 - `<input desired password>`
- Login as kafka
- `tar xzf kafka_2.11-1.0.0.tgz`

Kafka is now installed in its own directory.

4 BroadWorks Log Collector

The BroadWorks Log Collector is a set of two applications. First the bwlogsender – is an application that runs on BroadWorks nodes that via a configuration file collects logs as they are generated, formats them for transport and sends them across a compressed stream to the bwlogreceiver. The receiver then parses the logs for specific information and indexes the log into Elasticsearch.

This section provides guidance on the installation and configuration of the applications

4.1 Recommended BroadWorks Configuration

It is recommended that the Call Correlation Feature be enabled on the supported interfaces as it provides uniqueness in logging allowing correlation of events across and between servers. You can get the specifics of the configuration from Feature Description on Xchange Portal:

http://xchange.broadsoft.com/php/xchange/system/files/Release_20/ReleaseDocs/FeatureDescriptions/CallCorrelationIdentifierFD-R200.pdf

Note: The feature is first available in BroadWorks R19.sp1 via feature patches and generally available in R20.

4.2 Kafka Support

As of Release 4.0, the BroadWorks Log Collector supports using Kafka to manage communicating logs between Log Collector components.

The bwlogsender component acts as a Kafka producer and writes logs to the configured Kafka topic.

The bwlogreceiver component acts as a Kafka consumer and reads logs from the configured Kafka topic. The Kafka consumer group for the bwlogreceiver is also configurable.

4.3 bwlogsender

This application runs on the BroadWorks nodes. The package is provided as a self-extracting archive and is required to be installed as root. It is installed in /usr/local/bwlogsender/. Inside the bwlogsender directory – there will be a symlink called bwlogsender which is symlinked to bwlogsender_<version> to facilitate upgrades. When ran, the java application runs as bwadmin. Additionally a startup script is installed in the rc.d system so the application will start automatically after a server restart.

The package file name is structured as bwlogsender_<version>.run.

4.3.1 Installation & Configuration

The following are the commands and configuration to install bwlogsender

- Login to the BroadWorks server as root
- cd to the directory of the bwlogsender_<version>.run file

- `chmod 755 bwlogsender_<version>.run`
- `./bwlogsender_<version>.run`

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
Do you want to enable this application:	Whether you want the initial state of the application to be able to run	2 – Yes
What is the Server Type: [AS]	What the BroadWorks Server Type is. Application should auto detect the server type	BroadWorks Server Type
What is the Receiver Server host:	The hostname or IP address where bwlogreceiver is/will be running.	No default
What is the Receiver Server port to use:	The port the bwlogreceiver is listening to	9072
What is the desired size of the Sender Log Queue Size:	The Log Queue size between the log readers and the transmitter queues. This size should be optimal for normal networks	1000
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka server	No default
What is the KafkaServer port to use:	This is the port number in which the Kafka server is running	9092
What is the topic name to publish the logs:	This is the topic name in Kafka to publish the logs	bwlog
What is the Kafka group to publish the logs:	This is the group name under which the topic is registered.	sendgroup
Is Kafka enabled:	This indicates if logs will be transmitted to Kafka	false

What is the desired number of Sender Write Threads:	The number of sender/transmitter threads. The default of 1 should be sufficient for normal networks	1
What is the desired Zip Block Size:	The Zip Block Size is the size of the block (of logs) will be used for compression. 128000 has proven to be an optimal size.	128000
What is the desired JVM Heap Size:	JVM Heapspace for the application. 512M is the default and sufficient for the rest of the settings	512M

- To start the application – shouldn't be done until the receiver is installed and running – do one of the following
 - As root – “service bwlogsender start”
 - As bwadmin – “/usr/local/bwlogsender/bwlogsender/bwlogsender.pl –start
 - To verify application status – “/usr/local/bwlogsender/bwlogsender/bwlogsender.pl –showrun
- To stop the application
 - As root – “service bwlogsender stop”
 - As bwadmin – “/usr/local/bwlogsender/bwlogsender/bwlogsender.pl --stop

4.3.2 Log Collection Configuration

In the installation directory (/usr/local/bwlogsender/bwlogsender) there are per server type configuration that gives the application directives on which files are sent to the receiver and provides some flexibility on the InputChannel selection. Below is an example snippet of the Application Server configuration file:

- channelfile:XSLog:/var/broadworks/logs/appserver:XSLog*:dailyserver
- channelfile:PSLog:/var/broadworks/logs/appserver:PSLog*:dailyserver
- channelfile:AuditLog:/var/broadworks/logs/appserver:AuditLog*:dailyserver

The content is a colon delimited elements described below:

Element	Description	Example Content
---------	-------------	-----------------

channelfile	This is simply a directive token used by the configuration file parser. There may be a need in the future to have other directives.	channelfile
Application	This element is indexed into the application element in the Log json document indexed into ES. It is used by the receiver for content specific parsing.	XSLog/PSLog/AuditLog etc
Path to the log files	Simply the path the sender scans for the files	N/A – see above
File name prefix	The sender uses the path and the prefix to scan for files to send to the receiver to eventually be indexed into ES	N/A – see above
BroadWorks input channel filter directive	Allows to filter which input channels from the log file are sent to the receiver. It is a space delimited list of input channels. Either the directive is a list of channels to exclude (including all others) or a include list where the sender will only send logs from the specific input channel.	<p>To only index SIP related logs: + Sip SipMedia</p> <p>To exclude SIP related logs and include everything else: - Sip SipMedia -</p>

Directive on how the index is created (time based) in ES for the log type.	Token that tells the receiver where to index the log content.	<p>The tokens supported:</p> <p>dailyserver – indicates that the logs will be put into an index named: bwlog-<hostname>-yyyyMMdd</p> <p>daily – the indexes will be per Application per day: bwlog-<hostname>-<application>-yyyyMMdd</p>
--	---	--

4.4 bwlogreceiver

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user (in the example “elastic”). It is installed in the current working directory into a new directory bwlogreceiver. Inside the bwlogreceiver directory – there will be a symlink called bwlogreceiver which is symlinked to bwlogreceiver_<version> to facilitate upgrades.

The package file name is structured as bwlogreceiver_<version>.run.

4.4.1 Installation & Configuration

The following are the commands and configuration to install bwlogreceiver.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 bwlogreceiver_<version>.run
- ./bwlogreceiver_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9200 – if there have been customizations to ES – then the listening port of the http connections.	9200
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default
What is the desired size of the Log Processor Queue Size	This is log queue size between the receiver threads and the indexer. 200 is optimal but care should be taken as it affect the JVM heap size.	200
What is the desired number of Log Processor Threads:	This is number of threads processing incoming logs – parses and indexes. The default is 8. This should be half the number CPU's in the system.	8
What is the desired JVM Heap Size:	Default JVM heap size. Optimal sizing based on other configuration. This should be increased as the other parameters are increased.	1024m
What is the path to the Java installation:	Path to Java. Should be auto-detected and will only be prompted for if it is found in the “normal” locations.	No default unless found by installation script.
What is the user ID to use for Elasticsearch:	If using Elasticsearch authentication, this is the user to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH

What is the password to use for Elasticsearch:	If using Elasticsearch authentication, this is the password to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the path of the truststore:	The filesystem path the truststore, which holds trusted CA certs.	No default
What is the truststore file password:	The password for verifying the truststore content.	No default
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka Server	No default
What is the Kafka Server port to use:	This is the port number of the Kafka Server:	9092
What is the Kafka Topic name to subscribe:	This is the topic name to subscribe for the logs:	No default
What is the group name to subscribe:	This is the group name to subscribe for the logs:	No default
Kafka is enabled:	This indicates whether to use Kafka (true or false):	No default

- Once installed – the Index Template (like a schema) needs to be installed in the Elasticsearch instance
 - As the elastic user – cd /home/elastic/bwlogreceiver/bwlogreceiver
 - ./log_template.pl <hostname of the Elasticsearch instance>
 - See the following link for more information on index templates:
<https://www.elastic.co/guide/en/elasticsearch/reference/current/indices-templates.html>

- To start the application, do the following:
 - As the elastic user – `/home/elastic/bwlogreceiver/bwlogreceiver/bwlogreceiver.pl --start`
 - To verify application status – `/home/elastic/bwlogreceiver/bwlogreceiver/bwlogreceiver.pl --showrun`
- To stop the application, do the following:
 - As the elastic user – `/home/elastic/bwlogreceiver/bwlogreceiver/bwlogreceiver.pl --stop`

4.5 Log Collector for Kibana Plugins

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user (in the example “elastic”). It is installed in the current working directory into a new directory `bwlogcollector`. Inside the `bwlogcollector` directory – there will be a symlink called `bwlogcollector` which is symlinked to `bwlogcollector_<version>` to facilitate upgrades.

The package file name is structured as `bwlogcollector_<version>.run`.

SIP Analyzer requires log collector to process SIP Sequence Diagram and OCI transactions such as Query Group, Query User & Tech Support..

4.5.1 Installation & Configuration

The following are the commands and configuration to install `bwlogcollector`.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user `elastic`)

- Login to the server as `elastic`
- `cd` to `/home/elastic`
- `chmod 755 bwlogcollector_<version>.run`
- `./bwlogcollector_<version>.run`

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9200 – if there have been customizations to ES – then the listening port of the http connections.	9200

What is the path to the Java Executable	Path to Java. Should be auto-detected and will only be prompted for if it is found in the “normal” locations.	No default unless found by installation script.
What is the user ID to use for Elasticsearch:	If using Elasticsearch authentication, this is the user to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the password to use for Elasticsearch:	If using Elasticsearch authentication, this is the password to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the path of the truststore:	The filesystem path the truststore, which holds trusted CA certs.	No default
What is the truststore file password:	The password for verifying the truststore content.	No default

- Ensure the bwlogreceiver is installed and log_template.pl is executed successfully before starting the bwlogcollector.
- To start the application, do the following:
 - As the elastic user – “/home/elastic/bwlogcollector/bwlogcollector/bwlogcollector.pl —start”
 - To verify application status – “/home/elastic/bwlogcollector/bwlogcollector/bwlogcollector.pl —showrun”
- To stop the application, do the following:
 - As the elastic user – “/home/elastic/bwlogcollector/bwlogcollector/bwlogcollector.pl —stop”

5 CDR Collectors

5.1 bwcdprocessor

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user – in our example “elastic”. It is installed in the current working directory. Into a new directory bwcdprocessor. Inside the bwcdprocessor directory – there will be a symlink called bwcdprocessor which is symlinked to bwcdprocessor_<version> to facilitate upgrades.

The package file name is structured as bwcdprocessor_<version>.run.

The way this collector works is that the BroadWorks Application Server is configured to ftp the accounting records (either XML or CSV) to the server that is acting as the collector. Once there, this application is executed through cron to audit the receiving directory for new files which then are parsed and processed into Elasticsearch. The directory structure needed for this is a main directory location with a directory with a new and archive directory within it. In our example we have used – we’ll use the following

- /home/elastic/cdrfiles
- /home/elastic/cdrfiles/new
- /home/elastic/cdrfiles/archive

What happens is the “new” directory is where the Application Servers push the files to – then the application will process then move the file(s) to the archive directory.

Please review the Broadworks Application Server CLI Guide for information to configure accounting for this application.

5.1.1 Installation & Configuration

The following are the commands and configuration to install bwcdprocessor.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 bwcdprocessor_<version>.run
- ./bwcdprocessor_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
--------	-------------	---------

What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9200 – if there have been customizations to ES – then the listening port of the http connections.	9200
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default
What is the prefix to use for Elasticsearch CDR Indexes:	This is the prefix to use for the applications creation of CDR Indexes. BroadSoft suggests bwcd as this the index patterns used by the Visualizations and Dashboards provided.	No default
What interval is desired for unique Elastic Search Indexes:	This is the interval that a new index will be created. The options are Never, Monthly or Daily	Never
What is the user ID to use for Elasticsearch:	If using Elasticsearch authentication, this is the user to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the password to use for Elasticsearch:	If using Elasticsearch authentication, this is the password to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the path of the truststore:	The filesystem path the truststore, which holds trusted CA certs.	No default

What is the truststore file password:	The password for verifying the truststore content.	No default
What is the path to process CDR files:	This is the path that is discussed in section 4.1	No default
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka server	No default
What is the KafkaServer port to use:	This is the port number in which the Kafka server is running	9092
What is the topic name to publish the logs:	This is the topic name in Kafka to publish the logs	No default
Is Kafka enabled:	This indicates if logs will be transmitted to Kafka	false

Once installed – the Index Template (like a schema) needs to be installed in the Elasticsearch instance

- As the elastic user – `cd /home/elastic/bwcdprocessor/bwcdprocessor`
- `./cdr_template.pl <hostname of the Elasticsearch instance>`

See the following link for more information on index templates:

<https://www.elastic.co/guide/en/elasticsearch/reference/5.2/indices-templates.html>

An example cron is the following (this follows that the Application Server is configured to send files 288 times (Every 5 minutes)).

```
0,5,10,15,20,25,30,35,40,45,50,55 * * * *
/home/elastic/bwcdprocessor/bwcdprocessor/cdrProcessor.pl >
/home/elastic/bwcdprocessor/bwcdprocessor/cdrProcessor`date +%d`.log 2>&1
```

5.2 bwradiusprocessor

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user – in our example “elastic”. It is installed in the current working directory. Into a new directory bwradiusprocessor. Inside the bwradiusprocessor directory – there will be a symlink called bwradiusprocessor which is symlinked to bwradiusprocessor _<version> to facilitate upgrades.

The package file name is structured as bwradiusprocessor _<version>.run.

The way this collector works is that the BroadWorks Application Server is configured to push the radius accounting records to the server hosting this application. This is a running application that parses and indexes the radius records real time.

Please review the Broadworks Application Server CLI Guide for information to configure accounting for this application.

5.2.1 Installation & Configuration

The following are the commands and configuration to install the bwradiusprocessor.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 bwradiusprocessor_<version>.run
- ./ bwradiusprocessor_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9200 – if there have been customizations to ES – then the listening port of the http connections.	9200
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default
What is the prefix to use for Elasticsearch CDR Indexes:	This is the prefix to use for the applications creation of CDR Indexes. BroadSoft suggests bwcd as this the index patterns used by the Visualizations and Dashboards provided.	No default

What is the user ID to use for Elasticsearch:	If using Elasticsearch authentication, this is the user to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the password to use for Elasticsearch:	If using Elasticsearch authentication, this is the password to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the path of the truststore:	The filesystem path the truststore, which holds trusted CA certs.	No default
What is the truststore file password:	The password for verifying the truststore content.	No default
What interval is desired for unique Elastic Search Indexes:	This is the interval that a new index will be created. The options are Never, Monthly or Daily	Never
What is the Radius Accounting Shared Secret:	This should be configured as the same value as provisioned in the application server.	No default
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka server	No default

What is the KafkaServer port to use:	This is the port number in which the Kafka server is running	9092
What is the topic name to publish the logs:	This is the topic name in Kafka to publish the logs	No default
Is Kafka enabled:	This indicates if logs will be transmitted to Kafka	false

- Once installed – the Index Template (like a schema) needs to be installed in the Elasticsearch instance
 - As the elastic user – `cd /home/elastic/bwradiusreceiver/bwradiusreceiver`
 - `./radius_cdr_template.pl <hostname of the Elasticsearch instance>`
 - See the following link for more information on index templates:
<https://www.elastic.co/guide/en/elasticsearch/reference/2.1/indices-templates.html>
- To start the application, do the following:
 - As the elastic user – `"/home/elastic/bwradiusprocessor/bwradiusprocessor/bwradiusreceiver.pl --start"`
 - To verify application status – `"/home/elastic/bwradiusprocessor/bwradiusprocessor/bwradiusreceiver.pl --showrun"`
- To stop the application, do the following:
 - As the elasticuser – `"/home/elastic/bwradiusprocessor/bwradiusprocessor/bwradiusreceiver.pl --stop"`

5.3 Kafka Support

As of Release 4.0, the CDR Collectors support using Kafka to separate the CDR collection function and indexing the CDRs into Elasticsearch.

The CDR Collectors act as Kafka producers and write CDRs to the configured Kafka topic.

The Kafka Receiver component acts as a Kafka consumer and reads CDRs from the configured Kafka topic and indexes them into Elasticsearch. The Kafka consumer group for the Kafka Receiver is also configurable. The Kafka Receiver component (see [8 Kafka Receiver](#)) **must be installed in order for Kafka support to work as intended.**

The Kafka topic name configured in the CDR Collectors must match the topic name configured in at least one instance of a Kafka Receiver so that records written to a Kafka topic will be read by the receiver and indexed in Elasticsearch.

Note that if sending to Kafka is enabled, the CDR Collectors will not attempt to index directly to Elasticsearch.

6 Message Archive Processor

6.1 messagearchiveprocessor

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user – in our example “elastic”. It is installed in the current working directory. Into a new directory messagearchiveprocessor. Inside the messagearchiveprocessor directory – there will be a symlink called messagearchiveprocessor which is symlinked to messagearchiveprocessor_<version> to facilitate upgrades.

The package file name is structured as messagearchiveprocessor_<version>.run.

This processor is an application that is executed from cron and fetches the Message Archive file from the Profile Servers that generated by the Messaging Server. It retrieves the instant messages that have been archived (the application ignores the content of the instant messages) and indexes them into Elasticsearch. The purpose of this application is for analysis and patterns of usage across the Enterprises and Service Providers.

Note: Please review the Message Archive documentation on Xchange for configuring the access lists for this application to connect and fetch the archived logs.

6.1.1 Installation & Configuration

The following are the commands and configuration to install messagearchiveprocessor.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 messagearchiveprocessor_<version>.run
- ./messagearchiveprocessor_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the ProfileServer URL:	This is the URL to the Profile Server URL configured for the Message Archive application.	No default
What is the ProfileServer UserName:	This is the username to pass to the Profile Server to fetch the Message Archive logs.	No default

What is the ProfileServer Password:		
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9300 – if there have been customizations to ES – then the listening port of the native connections.	9300
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka server	No default
What is the KafkaServer port to use:	This is the port number in which the Kafka server is running	9092
What is the topic name to publish the logs:	This is the topic name in Kafka to publish the logs	No default
Is Kafka enabled:	This indicates if logs will be transmitted to Kafka	false

- Once installed – the Index Template (like a schema) needs to be installed in the Elasticsearch instance
 - As the elastic user – cd
/home/elastic/messagearchiveprocessor/messagearchiveprocessor
 - ./messagearchive_template.pl <hostname of the Elasticsearch instance>
 - See the following link for more information on index templates:
<https://www.elastic.co/guide/en/elasticsearch/reference/5.2/indices-templates.html>

Example:

An example cron is the following (this follows the default value that Message Archives are generated once an hour).

- 45 * * * *
/home/elastic/messagearchiveprocessor/messagearchiveprocessor/processMessageArchive >
/home/elastic/messagearchiveprocessor/messagearchiveprocessor/messagearchiveprocessor`date +%d`.log 2>&1

6.2 Kafka Support

As of Release 4.0, the Message Archive Processor supports using Kafka to separate the message collection function and indexing the messages into Elasticsearch.

The Message Archive Processor acts as a Kafka producer and writes archived messages to the configured Kafka topic.

The Kafka Receiver component acts as a Kafka consumer and reads the message from the configured Kafka topic and indexes them into Elasticsearch. The Kafka consumer group for the Kafka Receiver is also configurable. The Kafka Receiver component (see [8 Kafka Receiver](#)) **must be installed in order for Kafka support to work as intended**.

The Kafka topic name configured in the Message Archive Processor must match the topic name configured in at least one instance of a Kafka Receiver so that records written to a Kafka topic will be read by the receiver and indexed in Elasticsearch.

Note that if sending to Kafka is enabled, the Message Archive Processor will not attempt to index directly to Elasticsearch.

7 Subscriber Dump

7.1 subscriberdumpprocessor

This application runs on another server. The package is provided as a self-extracting archive and is required to be installed as a normal user – in our example “elastic”. It is installed in the current working directory. Into a new directory subscriberdumpprocessor. Inside the subscriberdumpprocessor directory – there will be a symlink called subscriberdumpprocessor which is symlinked to subscriberdumpprocessor_<version> to facilitate upgrades.

The package file name is structured as subscriberdumpprocessor_<version>.run.

This processor is an application that is executed from cron and does the following:

- Logs in through OCI to the Secondary Application Server
- Executes the SystemExportSubscriberRequest OCI Transaction. This transaction dumps specific Enterprise/Group/User information into XML files
- Logs out of OCI
- scp's the files from the Application Server
- Processes the XML files and indexes the content into Elasticsearch

Note: If there is apprehension to storing Admin credential on this server – it is possible to simply process the files without doing the OCI command or the SSH. This way a back office could do the processing and simply ship the files to location the application can process the files.

7.1.1 Installation & Configuration

The following are the commands and configuration to install subscriberdumpprocessor.

The following detail of the commands assumes running in the same server as ES was installed into (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 subscriberdumpprocessor_<version>.run
- ./subscriberdumpprocessor_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default

What is the Elastic Server port to use:	Normally 9300 – if there have been customizations to ES – then the listening port of the native connections.	9300
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default
What is the Elastic Search Index Name to index Subscriber Export data into:	The name of the Index to store the message archive content.	No default
The data below can be entered more than once, supporting multiple AS instances.		
What is the Secondary AS host/IP:	The IP address or hostname of the Secondary AS.	No default
What is the OCI Admin Username:	An Admin user name for the Application Server	No default
What is the OCI Admin Password:	The password for the Admin user above.	No Default

Note: For the OCI transactions to complete successfully, it is necessary to add the hostname/address of the server running subscriberdumpprocessor to all Application Servers' OCI (Provisioning) network ACLs. That configuration requires administrative privileges on the AS.

Note: When the subscriber dump processor transfers the files from the AS using scp, scp will prompt for user "bwadmin" password. To avoid this prompt and run non-interactively, on the host where the dump processor is installed run the following at the bash prompt:

- "ssh-keygen"

This command generates a key for the default ssh identity. If you already have a key, this command will overwrite it. If you wish to use and manage multiple keys for different hosts and identities, check the man page "man ssh_config".

- "ssh-copy-id bwadmin@<Secondary AS host>"

This command will copy the public key for the identity and append it to the "authorized_keys" file for the account bwadmin on the Secondary AS host (as configured in the properties file above).

If you have multiple hosts in the subscriber dump configuration properties, you only need to call "ssh-keygen" once, but you need to execute "ssh-copy-id" for each AS host.

Example:

An example cron is the following (only recommending to do once a day – can be modified to do once a week or month if desired):

- `35 01 * * *`
`/home/elastic/subscriberdumpprocessor/subscriberdumpprocessor/SubscriberExportDriver.pl >>`
`/home/elastic/subscriberdumpprocessor/subscriberdumpprocessor/processor.log 2>&1`

8 Kafka Receiver

8.1 eskafkareceiver

8.1.1 Overview

The Kafka Receiver component is required if the CDR collector (section [5 CDR Collectors](#)) or Message Archive Processor (section [6 Message Archive Processor](#)) are configured to send to Kafka. The function of the Kafka receiver is to consume the Kafka topic populated by those collectors and index the CDRs and archived messages data to Elasticsearch.

The Kafka Receiver can run on any machine which has a network path to the Kafka and Elasticsearch clusters.

8.1.2 Installation and Configuration

The following are the commands and configuration to install bwlogreceiver.

The following example of the commands assumes running in the same server Elasticsearch runs (I.E. has user elastic)

- Login to the server as elastic
- cd to /home/elastic
- chmod 755 eskafkareceiver_<version>.run
- ./eskafkareceiver_<version>.run

The following table represents the prompts and a description that will be required for installation.

Prompt	Description	Default
What is the Elastic Server host:	IP or hostname of the ES server. Assuming local – you can enter 127.0.0.1	No default
What is the Elastic Server port to use:	Normally 9200 – if there have been customizations to ES – then the listening port of the native connections.	9200
What is the Elastic Server Cluster name:	The ES cluster name as configured cluster.name	No default

What is the desired JVM Heap Size:	Default JVM heap size. Optimal sizing based on other configuration. This should be increased as the other parameters are increased.	1024m
What is the path to the Java installation:	Path to Java. Should be auto-detected and will only be prompted for if it is found in the "normal" locations.	No default unless found by installation script.
What is the user ID to use for Elasticsearch:	If using Elasticsearch authentication, this is the user to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the password to use for Elasticsearch:	If using Elasticsearch authentication, this is the password to use. Leave default (NOAUTH) if not utilizing authentication	NOAUTH
What is the path of the truststore:	The filesystem path the truststore, which holds trusted CA certs.	No default
What is the truststore file password:	The password for verifying the truststore content.	No default
What is the Kafka Server host:	This should be the hostname or IP Address of the Kafka Server	No default

What is the Kafka Server port to use:	This is the port number of the Kafka Server:	9092
What is the Kafka Topic name to subscribe:	This is the topic name to subscribe for the logs:	No default
What is the group name to subscribe:	This is the Kafka consumer group name to subscribe for the logs:	No default

NOTE: the Kafka topic for the Kafka Receiver component **must be different** from the topic(s) used for the BroadWorks Log Collector components.

To start the application, do the following:

- As the elastic user – “/home/elastic/bwlogreceiver/bwlogreceiver/bwlogreceiver.pl —start”
- To verify application status –
“/home/elastic/eskafkareceiver/eskafkareceiver/eskafkareceiver.pl —showrun”
- To stop the application, do the following:
 - As the elastic user – “/home/elastic/eskafkareceiver/eskafkareceiver/eskafkareceiver.pl —stop”

9 Post-Processing Applications for Dashboards

9.1 Overview

The BroadWorks Dashboard Collector analytics post-processor toolset works with the BroadWorks Log collectors, CDR collector, Message Archive Processor, and Subscriber Dump described above. The post-processors mine additional data relationships from the raw data prepared by the collectors, and augment the collected data for aggregation in the dashboard visualizations.

The analytics post-processor toolset is a set of four applications.

- processSubscriberExport.sh - normalizes the records in the subscriberexport index to add userid, group, and serviceprovider fields.
- processUssIndices.sh - USS indices are mined for desktop share creation information. The fields userid, group, and serviceprovider are added to logs for all parties involved in the sharing session.
- processUmsIndices.sh - UMS indices are mined for their data about multi-user (group) chats, and what is the userid, group, and serviceprovider of the owner of these chat groups. This data is used in processing the message archive indices.
- processMessageArchiveIndex.sh - the user, group, and service provider information are added to the sender and receiver of each message. The group chat owner's userid, group and serviceprovider are added to messages that are part of a group chat.
- processXsIndices.sh - the User-agent header field value from SIP REGISTER logs is added as the field "useragent" to all logs that contain the header. The field is parsed in an attempt to add the following additional aggregatable keyword fields:
 - a. useragentvendor: the known vendor of the user agent device
 - b. useragentdevice: the device and model of the user agent
 - c. useragentversion: the version of the user agent device
 - d. useragentos: the operating system the useragent is running on, if included in the field

9.2 Requirements

The log collectors above must be installed and configured to send logs to an elasticsearch cluster.

USS servers must be configured to emit RoomControl log channel at FieldDebug severity in order to capture the relevant information.

1. UMS servers must be configured to emit MUC log channel at Info severity in order to capture the relevant information.
2. The post-processors are intended to be run on a linux server which has
 - a. Cron (typically part of a standard distribution)
 - b. The applications can be installed for and executed by any user.

9.3 Installation

To install the post-processing tools, transfer the self-extracting installer to the desired directory. The installer will create a build-specific directory, and will prompt the user for some important information:

- what is the address of the ES server?
- if X-Pack plugin is used, what is the ES username and password?

Example installation:

```
userx:~$ postprocessors_1234.run
Creating directory ./bwanalyt/bwanalyt_1234
Verifying archive integrity... All good.
Uncompressing BW Analytics Post-processors 100%
configuring the elasticsearch server(s)...
enter es server hostname: 10.1.2.3
enter es server port: 9200
another? (Y/n) n
do you wish to configure security? n
what is the subscriber index? subscriberexport
what is the USS analytics index? bwanalytics-uss
what is the USS log index pattern? bwlog*
what is the USS log timestamp fieldname? logtimestamp
what is the UMS analytics index? bwanalytics-ums
what is the UMS log index pattern? bwlog*
what is the UMS log timestamp fieldname? logtimestamp
what is the XS log index pattern? bwlog*
what is the XS log timestamp fieldname? logtimestamp
what is the message archive index pattern? messagearchive_*
what is the message archive log timestamp fieldname? messagetimestamp
should message archive processing wait for UMS? true
subscriber index: subscriberexport
USS analytics index: bwanalytics-uss
USS log index pattern: bwlog*
USS log timestamp fieldname: logtimestamp
UMS analytics index: bwanalytics-ums
UMS log index pattern: bwlog*
UMS log timestamp fieldname: logtimestamp
message archive index pattern: messagearchive_*
message archive timestamp fieldname: messagetimestamp
message archive processing waits for muc: true
is this correct (y/N) y
userx:~$
```

9.4 Running the Post-processors

The processors can be run manually or can be set to run automatically via cron.

To execute all of the processors manually,

- `$./bwanalyt/processAll.sh`

- Execution by cron can be configured as in the following example:
 - `$ crontab -e`

00 06 * * * bash -c <install root directory>/bwanalyt/bwanalyt/processAll.sh

<Esc>:wq
 - `$ crontab -l`

00 06 * * * bash -c <install root directory>/bwanalyt/bwanalyt/processAll.sh

The processors can also be independently executed or scheduled with crontab.

Appendix: Installing Perl Module Pre-Requisites

Perl scripts in the various component applications mentioned in this document depend on some standard Perl modules that must be installed on your system in order for the scripts to run.

The scripts directly depend on these Perl modules:

- JSON
- Carp
- Text::CSV
- Data::Dumper
- Expect
- File::Basename
- File::Copy
- FindBin
- Time::Local
- Class::Singleton
- Search::Elasticsearch

Some of these may already be installed by your distribution. Those that are not will need to be installed.

NOTE: it is not necessary to install any additional Perl modules on BroadWorks servers.

Notes on Manual Installation

There are different ways to install Perl modules. Two ways discussed here are

- installing through your distribution package management repository
- installing through Comprehensive Perl Archive Network (CPAN)

Using CentOS as an example, the package repository is YUM.

```
[root@localhost ~]# yum install perl(Text::CSV)
```

Will install the "Text::CSV" module using the YUM repository.

Some of the modules listed above are not commonly available through distribution package managers, e.g. "Search::Elasticsearch". These modules can usually be installed via CPAN.

In order to use CPAN, make sure it is installed.

```
[root@localhost ~]# yum install perl-CPAN
```

Also, it is typical for C/C++ software to be compiled in support of building modules with CPAN. The package "gcc" will also need to be installed.

```
[root@localhost ~]# yum install gcc
```

Once CPAN and gcc are installed, CPAN can be used to build and install various Perl modules. Here is an example of installing with CPAN:

```
[root@localhost ~]# cpan

cpan shell -- CPAN exploration and modules installation (v1.9800)
Enter 'h' for help.

cpan[1]> install IO::Socket::SSL

<...skipping lines...>

/bin/make install -- OK

cpan[2]>
```

Perl Module Installation Using the Helper Script

If you are using CentOS, a helper script is available to automate the installation of the Perl modules. The script will install

- the software necessary to build and install Perl modules
- the Perl modules via the YUM repository
- any remaining required Perl modules via CPAN that were not available through YUM

Copy the `centos-pm-tool.sh` to the machine(s) where you are installing and running the dashboard components.

You can check to see what Perl modules need to be installed by running

```
[ user@localhost ~ ]# ./centos-pm-tool.sh check
```

If you choose to proceed with the automated install, invoke the script with the "install" command. The script will invoke all YUM and CPAN install commands with defaults of "yes". The install must be run with superuser privileges.

```
[ user@localhost ~ ]# su -

[ root@localhost ~ ]# ./centos-pm-tool.sh install
```

Appendix: Abbreviations

- SIP Session Initiation Protocol
- OCI Open Client Interface
- OCI-C Open Client Interface-Call Control
- OCI-P Open Client Interface-Provisioning
- OCI-R Open Client Interface-Reporting
- URI Uniform Resource Identifier
- URL Uniform Resource Locator
- VMS Voice Mail System
- VoIP Voice Over Internet Protocol
- XML eXtensible Markup Language
- XSD XML Schema Definition