SAP How-to Guide

SAP HANA™

Network Configuration for SAP HANA System Replication

Applicable Releases:

SAP HANA 1.0 & SAP HANA 2.0

Version 2.2

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Document History

Document Version	Description
1.0	First official release
1.1	Wrong reference in table of contents
1.2	Changed system replication hostname resolution
1.3	Correct system replication hostname resolution setting
2.0	SPS11 extensions
2.1	Minor correction
2.2	Minor additions

Typographic Conventions

Type Style	Description
Example Text	Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Cross-references to other documentation
Example text	Emphasized words or phrases in body text, graphic titles, and table titles
`Example text`	File and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
`Example text`	User entry texts. These are words or characters that you enter in the system exactly as they appear in the documentation.
`<Example text>`	Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.
`EXAMPLE TEXT`	Keys on the keyboard, for example, `F2` or `ENTER`.

Icons

Icon	Description
	Caution
	Note or Important
	Example
	Recommendation or Tip

Table of Contents

1. Before you start

It is recommended to have read the SAP HANA system replication sections in the following documents:

- *SAP HANA Master Guide*: Hostname Resolution for System Replication & Internal Hostname Resolution

You should also be aware of these SAP notes containing valuable information on SAP HANA system replication:

- SAP Note 2407186 - How-To Guides & Whitepapers For SAP HANA High Availability
- SAP Note 1876398 - Network configuration for System Replication in HANA SP6
- SAP Note 1969700 - SQL statement collection for SAP HANA (containing "replication" relevant SQL statements in the attachment)

2. Scale-out network configuration

If nothing else is configured during the installation of SAP HANA, the hostnames known to the operating system[1] are used as HANA hosts – called internal hostnames. For all communication between the SAP HANA services (index server, name server, ...) these internal host names are used. This applies for the internal host communication in a scale-out HANA as well as for the replication host communication in a SAP HANA system replication configuration.

2.1 Virtual hostnames

During the installation of SAP HANA, you can also specify alternative HANA host names – called *virtual hostnames* as HANA internal hostnames. To specify virtual hostnames during installation, use the following option with the installation tool `hdblcm`:

```
hdblcm … --hostname=<virtualhostname>
```

These hostnames must be resolvable during installation time and later during SAP HANA operation. This can be achieved by adding hostname-to-address mappings for the TCP/IP subsystem for all hosts of a distributed HANA to the operating system file `/etc/hosts`, or by configuring in the `DNS`, or through some other OS

[1] The OS command "`hostname -f`" will show the fully qualified domain names (FQDN) of the hosts.

hostname resolution way. This must be done on all hosts of the scale-out system and could, e. g. for one host look like this (where the FQDN is optional):

```
127.0.0.1   localhost
127.0.0.2   host1.wdf.sap.corp host1
10.68.91.01 virtualhost01.wdf.sap.corp virtualhost01
10.68.91.02 virtualhost02.wdf.sap.corp virtualhost02
...
10.68.91.16 virtualhost16.wdf.sap.corp virtualhost16
```

The <virtualhostname> will be used as the HANA internal hostname (like described above).

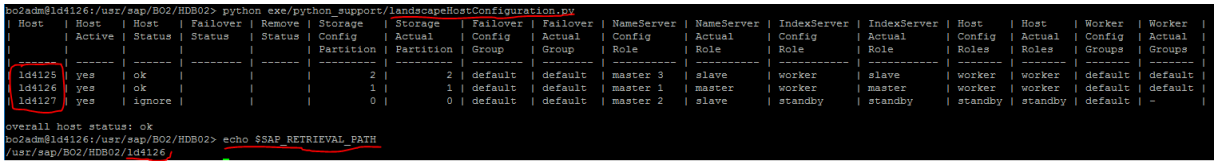
2.2 Find out the internal hostnames

The HANA installation extracts the hostname and stores it in the sapstart service profiles as SAPLOCALHOST. The internal hostname can for example be seen in these paths:

```
/usr/sap/<SID>/HDB<nr>/<hostname>/sapprofile.ini
/usr/sap/<SID>/SYS/profile/<SID>_HDB<No.>_<hostname>
```

Another way is to look at any of the SAP HANA system views containing a HOST column; these will always show the internal host names, e. g. check in M_DATABASE with SQL.

You can also simply call the python script landscapeHostConfiguration.py (as <sid>adm on command line) which will print out the host names used by your SAP HANA database.



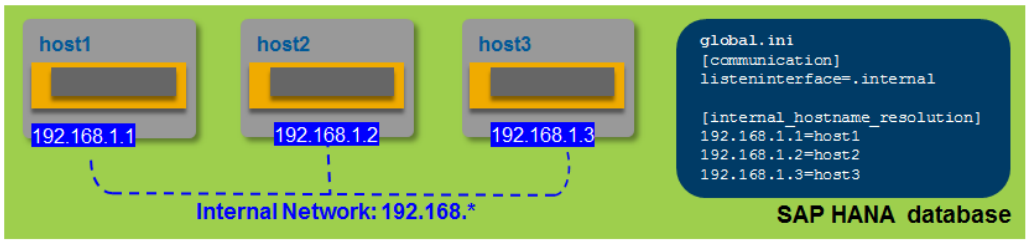
2.3 Internal hostname resolution

A scale-out system can run with or without a separate network definition for the inter-service communication. However, it is recommended to exclusively configure a network only for this internode communication. This can be configured with a *dedicated internal network* either at installation time (security measure) using the following parameter with hdblcm:

```
hdblcm … --internal_network=192.168.1.0/20
```

By adapting the ini file section **internal_hostname_resolution**

SAP HANA services will only listen on the interface specified as "`internal`" in the `/usr/sap/<SID>/SYS/global/hdb/custom/config/global.ini` file of the system:



As shown in the picture, the `internal_hostname_resolution` section contains mappings of IP addresses to the internal hostnames.

> Note
> To resolve the internal hostnames for SAP HANA first the setting of `[internal_hostname_resolution]` is used, if configured, before the operating system does the hostname resolution (e. g. through `/etc/hosts` or `DNS`).

3. System replication network configuration

Changes regarding network used by SAP HANA system replication to `global.ini` must be done prior to registering the secondary, because „`-sr_register`" uses this mapping.

`listeninterface` and `[internal_hostname_resolution]` can be set manually or automatically if the options `--addhost` and optionally `--internal_network` is specified during SAP HANA database installation.

3.1 System Replication Hostname Resolution

By default, the primary and secondary systems establish communication using the *internal host names*. The system replication hostname resolution to configure a separate network for the data replication communication is done by mapping IP addresses to hostnames (similar to the entries in `/etc/hosts`).

> Important
> It is required to use *virtual host* names with SAP HANA system replication, which can be used on both sites without the need to adapt the local

`/etc/hosts` entries accordingly. The hostnames in the primary system must be different to hostnames in the secondary system (as `<sid>adm` check with the python script `$DIR_INSTANCE/exe/python_support/landscapeHostConfiguration.py`)

With an `IPaddress–internalHostname` mapping on the involved sites the system replication hostname resolution can be set up. This way, a separate network for system replication data traffic between primary and secondary[2] is configured.

This is done in the section `[system_replication_hostname_resolution]` in `global.ini`, where all hosts of the primary and the secondary sites must be defined on each host:

```
global.ini/[system_replication_hostname_resolution]
   <ip-address_same_site>=<internal_host_same_site>
   <ip-address_other_site>=<internal_host_other_site>
```

This also applies for a multitier system replication consisting of three sites (primary, tier-2 secondary and tier-3 secondary) because roles can switch after takeovers and failbacks.

Note
The parameters in the `global.ini` file must be set prior to registering the secondary system, because the `-sr_register` command uses this mapping. Registration is one step in the process of configuring the secondary system.

Note
The setting of the `[system_replication_hostname_resolution]` is first used, if configured, before the operating system does the hostname resolution (e. g. through `/etc/hosts` or `DNS`).

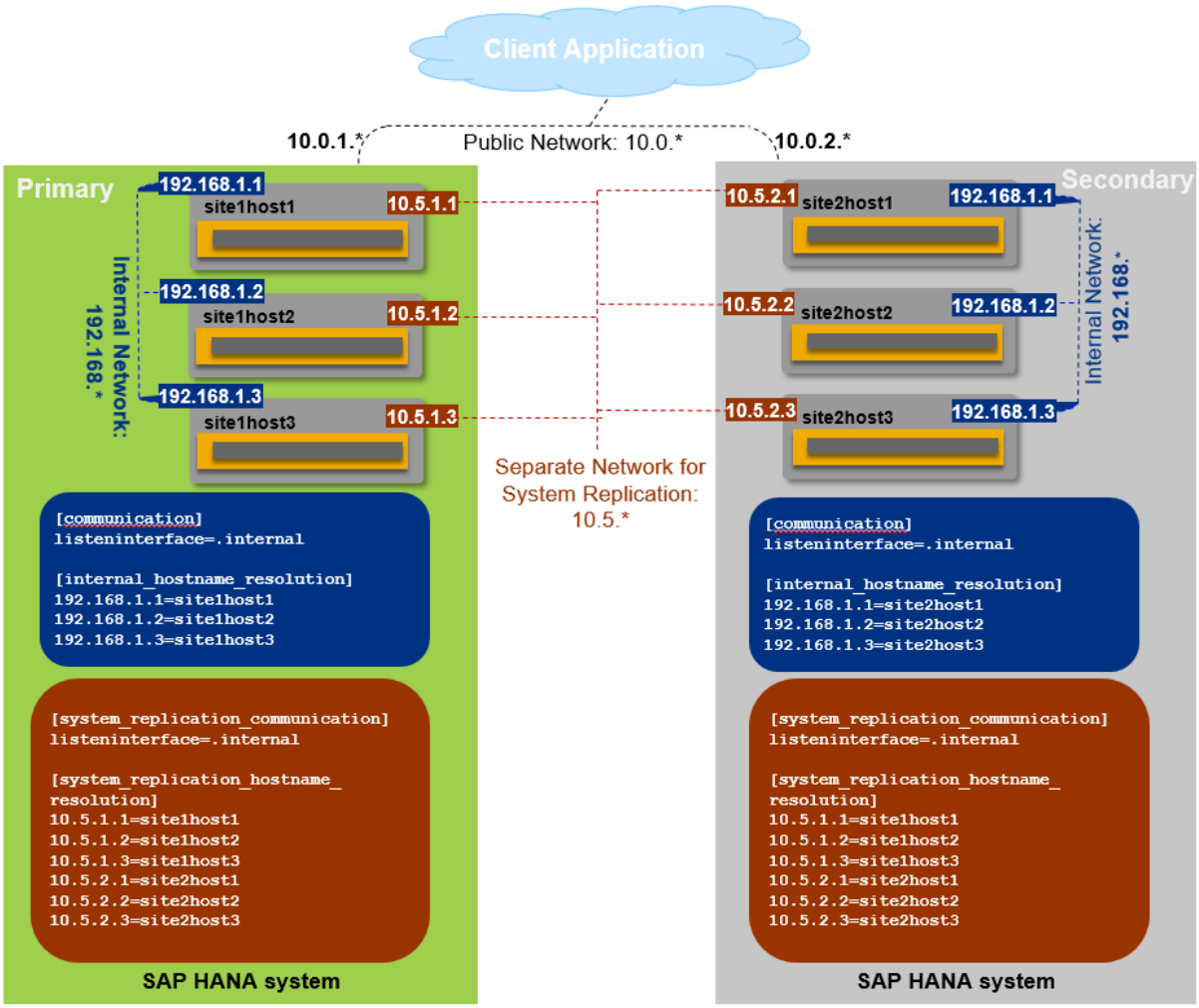
The entries in the `[system_replication_hostname_resolution]` section is used in combination with the `listeninterface` parameter in the `[system_replication_communication]` section. The following combinations are possible:

[system_replication _communication]	[system_replication_ hostname_resolution]	Additional Information

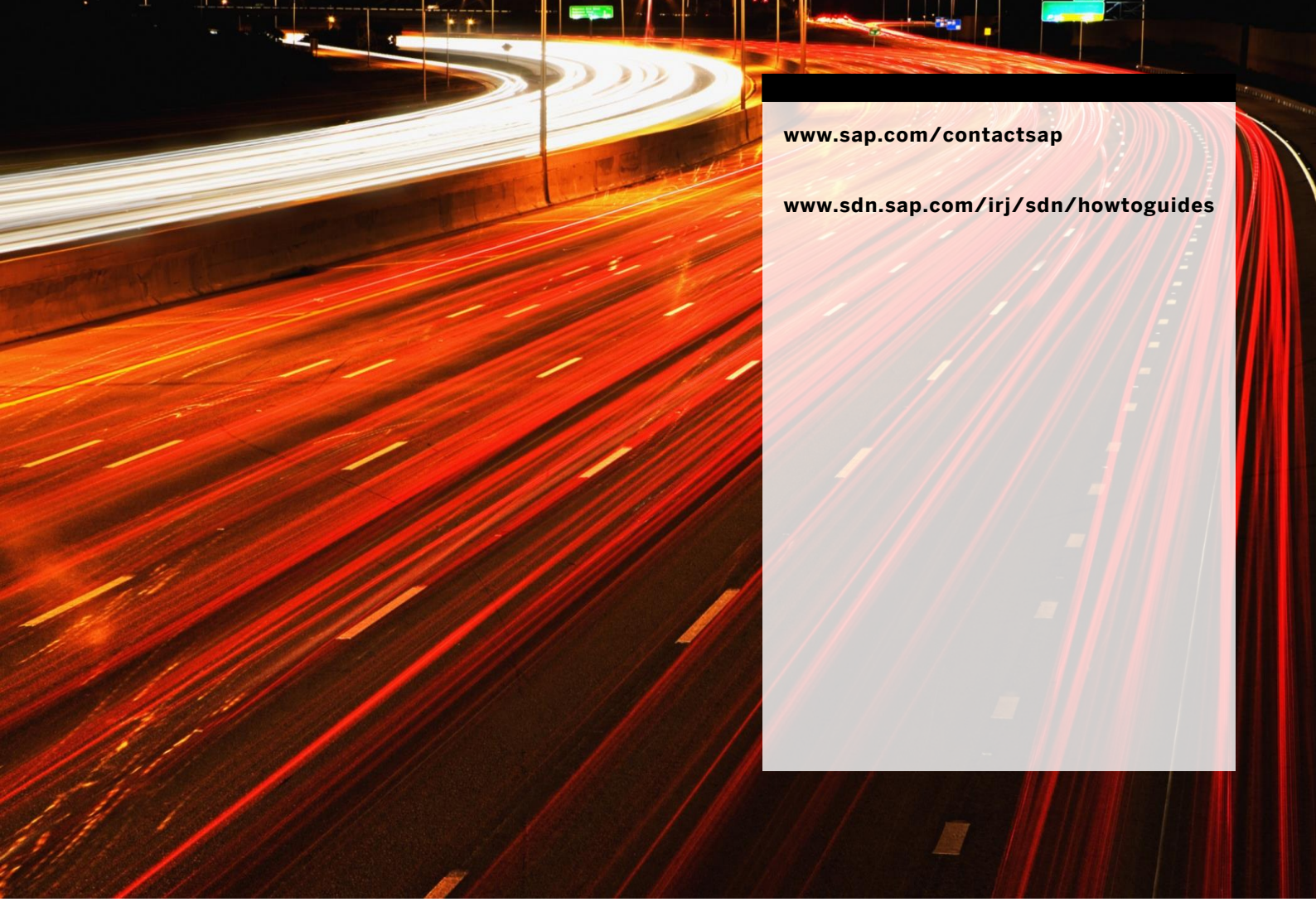
[2] As mentioned, in Multitier System Replication the tier 2 secondary serves as primary for the asynchronous replication to the tier 3 secondary.

listeninterface		
.global	No mappings specified	Default if nothing is specified. The default network route is used for system replication communication. This is normally the public network. ⚠ Caution If you use a public network instead of a separate network, you must secure this connection with additional measures such as a firewall or a virtual private network and/or SSL.
.global	Entries for the primary and secondary hosts (for all hosts in multitier setups)	A separate network is used for system replication communication.
.internal	Entries for the primary and secondary hosts	As of SPS11. Separate network is used for system replication communication. The primary hosts listen on the dedicated ports of the separate network only, and incoming requests on the public interfaces are rejected. ⚠ Caution In SAP HANA SPS 11, network communication for system replication with `listeninterface=.internal` is supported for two-tier replication but not for three-tier setups!

Here is an example of the settings for a 2-tier system replication (3 node system) using a separate internal network per site and a separate connection for the system replication.



Multi-node SAP HANA System Replication over separate network with separate internal network



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