

CUDB 1.13 Network Impact Report

NETWORK IMPACT REPORT

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1 Introduction

The Network Impact Report (NIR) describes the new and changed functions implemented in the Ericsson Centralized User Database (CUDB) since CUDB 16A FD1 and indicates how these changes affect the product and the overall network used by operators.

To find the changes applicable to a specific upgrade path, apply the filters by using the funnel icon on the upper left side of the browser.

The document also describes changes that are introduced with the software upgrade, but are part of functions planned for coming releases, see Section 6 on page 55. Each of the changes is described in the corresponding referenced documents.

Refer to the Functions section of [CUDB Technical Product Description, Reference \[1\]](#) for more information on CUDB functions.

1.1 Revision Information

Rev. A

Initial release.

Rev. B

Other than editorial changes, this document has been revised as follows:

- **CUDB CLI Commands and Parameters:** Updated information on OAM Automation with NETCONF Support impacts.

Rev. C

Other than editorial changes, this document has been revised as follows:

- Document structure rearranged.
- Section 2.1.1 on page 11: Updated Table 1, Table 2, and Table 3 with new capacity information.
- Section 5.1.3 on page 42: Updated with impact on notifications process.
- **CUDB CLI Commands:** Updated table with new, modified, and removed commands and command options.
- **Administrative Operations:** Added new section listing new administrative operations.



- **Parameters:** Updated table with new, modified, and removed classes and attributes.
- **Alarms:** Updated table section with alarms affected by Virtualized Network Function support.
- **Counters:** Updated with information on application counter installation.
- **Logging:** Updated with new and modified logging components.
- **Tools:** Added new section on executing Schema Update Tool dependency check.
- Updated Glossary.

Rev. D

Other than editorial changes, this document has been revised as follows for the CUDB 1.1 release:

- Section 1 on page 1: Added CUDB Key Performance Indicators (KPIs) to the list of enhancements.
- **Section 5.7.2. Impact:** Indicated KPI as enhancement impacting the function.
- **CUDB CLI Commands:** Updated table with new and modified command options.
- **Parameters:** Updated table with the new `cudbCounterPublishingPeriod` attribute.
- **Counters:** Updated section with list of new and modified counters.
- **Logging:** Updated list of new components with CUDB KPIs logging component.

Rev. E

Other than editorial changes, this document has been revised as follows for the CUDB 1.1 release:

- Complete restructure.
- Section 4.4 on page 31: Added information on the KpiCentral component.
- Section 6 on page 55: New section listing planned functions.

Rev. F

Other than editorial changes, this document has been revised as follows for the CUDB 1.2 release:



- Complete restructure: Functions and their related changes can now be found in separate sections.
- Section 3.1 on page 18: Added LDAP FE to the list of new and modified logging events.
- Section 5.3.2 on page 43: Updated Table 43 as follows:
 - Changed command option `-b | --bc-status` and new command option `-B | --new-bc-status` for `cudbSystemStatus`.
 - Deprecated command option `-R` for `cudbSystemDataBackupAndRestore`.
- Section 4.5 on page 33: Updated to reflect support of extended POSIX regular expressions.
- Section 5.3.1 on page 43: Added section to include the new tool option `-v` for `cudbCheckLdapViewMapping`.

Rev. G

Other than editorial changes, this document has been revised as follows for the CUDB 1.3 release:

- Section 3.2.1.3 on page 20: Updated section to note that only important events are logged in `ldap` logs.
- Section 4.1.2.1 on page 26: Added `-d | --dsg` and `-b | --blade` modified command options to `cudbEvipConfigExtension` command in Table 23.
- Section 4.5 on page 33: Added SOAP Notifications function enhancement.
- Section 5.1.2 on page 40: Added `ldapRootPassword` attribute to Table 40.
- Section 5.1.4 on page 42: Added new subsection on MySQL and LDAP root password improvements.
- Section 5.4 on page 44: Updated Table 44 as follows:
 - Added modified alarm Operating System, Server Configuration Backup Fault.
 - Added a modified attribute of `CudbExternalAuthServer`, `tlsMode`.
 - Added modified attribute of `CudbLocalNode`, `networkElementName`.
- Section 3.4.2 on page 21: Added new section to include `localReadsDSReplicationSafetyThreshold` attribute in new Table 16.

Rev. H

Other than editorial changes, this document has been revised as follows for the CUDB 1.4 release:



- Minor restructuring of the document.
- Section 2.1.1 on page 11: Updated Table 2 and Table 3 with new capacity information.
- **Section 2.2 Changes in Infrastructure Support:** Updated with new hardware migration procedure.
- Section 2.5 on page 16: Added changes concerning synchronous and asynchronous process.
- Section 3.3.1.1 on page 20: Updated Table 14 with new attribute `ldapViewName` in `CudbLdapView` class.
- Section 3.4 on page 21: Added Local Reads to new functions.
- Section 3.4.2 on page 21: Added new section. Added the following modified attribute to Table 16:
 - `localReadsDsReplicationDelayThreshold` in class `CudbLdapUser`. Updated the name of `localReadsDsReplicationDelayThreshold`.
- Section 3.4.2.1 on page 21: Added new counters.
- Section 3.4.2.2 on page 21: Updated impact of `localReadsDsReplicationDelayThreshold` attribute.
- Section 4 on page 26: Updated description.
- Section 4.1.1 on page 26: Updated impact in Table 22 of Flexible PL Deployment.
- Section 4.5 on page 33: Updated description.
- Section 4.6 on page 33: Added asynchronous LDAP proxy as new enhanced function.
- Section 5.1.1 on page 40: Updated Table 39 with asynchronous LDAP communication.
- Section 5.3.1 on page 43: Moved information back to current section and fixed `-v` to be tool option.
- Section 5.5 on page 45: Added the following to Table 46:
 - `cudbDataBackup`, `cudbSystemDataBackupAndRestore`, `cudbManageStore`, and `/opt/ericsson/cudb/OAM/bin/slapcat`, CLI commands and command options.
- Section 5.5.2.1 on page 46: Added LDAP FE Monitor, a modified logging component.
- Section 5.5.2.1.2 on page 46: Added `commandlog`.



- Section 5.5.1 on page 45: Added new section on `cron` task configuration procedure.
- **Section 6.1 CUDB Combined Hardware and Software Procedure:** Added new planned function.

Rev. J

Other than editorial changes, this document has been revised as follows for the CUDB 1.5 release:

- Section 2.5 on page 16: Updated the list of impacts with custom modifications in `sudoers` files.
- Section 4.1.1 on page 26: Updated the list of nodes in Table 22.
- Section 5.1.1 on page 40: Added example to Table 39 and updated the list of nodes.
- Section 5.1.4 on page 42: Added information about a new, more restrictive `umask`.
- Section 5.6.1 on page 46: Added the following to Table 47:
 - Updated access level of the `cudbadmin` group.
 - `cudbBCServersRestart` CLI command with `-f` | `--fast` command option.
 - `cudbFollowLdapfeLogs` CLI command with `-v` | `--invert-match` command option.
 - `cudbManageBCServer` CLI command with `-reset` `-no_check` command option.
 - `cudbManageNode` CLI command with `-d` | `--disable`, `-e` | `--enable`, `-b` | `--block`, `-u` | `--unblock`, `-n` | `--nodes`, `--no-prompt`, `--allow-node-skip`, `--apply-on-node`, `-h` | `--help` command options.
 - `cudbSystemStatus` CLI command with `-C` | `--new-cluster-status` command option.
 - `cudbSystemStatus` CLI Command `-r` is deprecated.
 - `cudbSystemStatus` CLI command with `-R` | `--new-replication-status` command option.
- Section 5.6.2 on page 47: Added new section containing new SOAP Notifications alarms.
- Section 5.6.3 on page 47: Added new section containing `rootdn` password changes.



- **Section 6.1.2 Changes in Upgrade Procedure:** Added new section to CUDB Combined Hardware and Software Procedure planned function about the changes in the upgrade procedure.
- Section 3.5 on page 22: Added new planned function.
- **Section 6.2 Virtualized CUDB Adaptation Framework:** Added new planned function.

Rev. K

Other than editorial changes, this document has been revised as follows for the CUDB 1.6 release:

- Section 2.1.1 on page 11: Updated description indicating the validity of measurements in Table 3.
- **Section 2.2 Changes in Infrastructure Support:** Updated title and added subsections Section 2.2 on page 13 and Section 2.3 on page 14.
- Section 2.2 on page 13: Updated with changes in hardware support from CUDB 1.6.
- Section 2.5 on page 16: Updated with impacts in CUDB 1.6.
- Section 3.5 on page 22: Added new section.
- Section 4.7 on page 34 and Section 4.8 on page 34: Added new sections and removed them from Functions Planned for Coming Releases.
- Section 5.7 on page 48: Added new section, and subsections and added `cudbLdapFeRestart` and Multicast Requirement Removal to the list of improvements. Updated the impact of new `-f` command option.
- Section 5.7.1 on page 48: Added Table 52.
- **Section 6.1 Improvement in Subscription Reallocation and Section 6.2 Smooth Migration to Virtualized CUDB:** Added new planned functions.

Rev. L

Other than editorial changes, this document has been revised as follows for the CUDB 1.7 release:

- Updated document title to CUDB 1.7 Network Impact Report.
- Added new upgrade path from 16A FD1 CP1.
- Section 2.1.1 on page 11: Updated figures in Table 2 and in Table 3.
- Section 5.2 on page 42: Updated the impact of `cudbSystemStatus` command in Table 42 and removed the examples.



- Section 5.8 on page 50: Added new section with subsections Section 5.8.1 on page 50, Section 5.8.2 on page 50, Section 5.8.3 on page 50, and Section 5.8.4 on page 51.
- Section 6 on page 55: Updated description.
- **Section 6.2 Full IPv6 Support in CUDB:** Added section.

Rev. M

Other than editorial changes, this document has been revised as follows for the CUDB 1.8 release:

- Section 2.1 on page 11: Updated description.
- Section 2.1.1 on page 11: Updated note. Updated EPC maximum node capacity in Table 3.
- Section 2.5 on page 16: Updated with impact in CUDB 1.8.
- Section 3.6 on page 23: Added section.
- Section 3.7 on page 23: Added section.
- Section 4.9 on page 34: Added Subscription Reallocation improvement to new enhanced functions.
- Section 5.9 on page 51: Added section with subsection Section 5.9.1 on page 51, regarding alarm changes in Table 57, and subsection Section 5.9.2 on page 51, regarding Centralized Security Event Logging Improvements.
- **Section 6.1 Smooth Migration to Virtualized CUDB:** Removed section because feature has been delivered and added to Section 3.7 on page 23.
- Section 4.12.1.1 on page 37: Added CudbTrafficBlockingRule class to Table 35.
- Section 4.12.1.2 on page 37: Added section with Table 36.
- Section 4.14 on page 38: Added section.
- Section 3.8 on page 24: Added section.

Rev. N

Other than editorial changes, this document has been revised as follows for the CUDB 1.9 release:

- Section 2.1.1 on page 11: Updated Table 2.
- Section 2.3 on page 14: Updated Table 5 with supported workflows from CUDB 1.9 onwards.



- Section 2.8 on page 17: Updated with backward compatibilities.
- Section 4.14 on page 38: Added section, regarding new planned function Image Based Instantiation.

Rev. S

Other than editorial changes, this document has been revised as follows for the CUDB 1.10 release:

- Section 2.1 on page 11: Added new consideration regarding Automatic Mastership Change Improvements. Updated the list of considerations.
- Section 2.2 on page 13: Removed vCUDB impact from Table 4. Updated Table 1 and Table 2.
- Section 2.3 on page 14: Added vCUDB impacts to Table 5.
- Section 2.5 on page 16: Added changes in the upgrade procedure from CUDB 1.4 and CUDB 1.10 onwards to Table 9.
- **Section 2.6.1 CUDB Licensing Fingerprint Tool:** Added section.
- Section 3.8 on page 24: Moved Migration to Virtualized CUDB through Backup and Restore to new functions.
- Section 3.9 on page 24: Added section with Section 3.9.1 on page 24, Section 3.9.2 on page 24, Section 3.9.2.1 on page 24 subsections, regarding HSS-EPC 5G Profile.
- Section 4.6 on page 33: Updated feature description.
- Section 4.10 on page 35: Added section.
- Section 5.10 on page 52: Added section with the following subsections:
 - Section 5.10.1.1 on page 52: Added section regarding LDAP FE log files.
 - Section 5.10.2 on page 52: Added section regarding Electronic Software License Improvement.
- **Section 6.4 Optimized Subtree Searches:** Added section regarding planned Optimized Subtree Searches function.

Rev. T

Other than editorial changes, this document has been revised as follows for the CUDB 1.11 release:

- Section 2.3 on page 14: Updated impact of Multicast Removal.
- Section 3.10 on page 25: Added new function, regarding Optimized Subtree Seaches.



- Section 4.11 on page 36: Added section to new functions.
- Section 4.12 on page 36: Added new enhanced function, IPv6 Support in CUDB.
- Section 5.7.2 on page 49: Updated title.
- Section 5.7.2.1.2 on page 49: Updated cudbManageMsgSrvServer command in Table 54.
- Section 5.11 on page 53: Added section with Table 60, regarding alarm changes and with Table 61, regarding cudbSwBackup and cudbAppCheckerManager command changes.
- **Section 6.1 Full IPv6 Support in CUDB:** Removed section because feature has been delivered and added to Section 4.12 on page 36.
- **Section 6.4 Optimized Subtree Searches:** Removed section because feature has been delivered and added to Section 3.10 on page 25.

Rev. U

Other than editorial changes, this document has been revised as follows for the CUDB 1.12 release:

- Section 2.1 on page 11: Updated the list of considerations to take into account due to one software track.
- Section 2.1.1 on page 11: Updated table notes and **Maximum node capacity** in Table 1, updated table notes and **Maximum node capacity** in Table 2, and updated table note in Table 3.
- Section 2.3 on page 14: Updated release and impact in Table 5.
- Section 2.3.2 on page 15: Added subsection.
- Section 2.5 on page 16: Added impact from CUDB 1.12 onwards.
- Section 2.8 on page 17: Updated description.
- Section 3.10 on page 25: Updated description.
- Section 5.12 on page 53: Added new section with subsections Section 5.12.1 on page 53 and Section 5.12.2 on page 54.
- Section 6.1 on page 55: Updated section title, and the structure of the section by moving the content to Section 6.1.1 on page 55, and added new planned function and Section 2.3.1.1 on page 15.
- Section 4.15 on page 39, Section 4.16 on page 39, former section 6.5 **GEP7L Support:** Added sections.



Rev. V

Other than editorial changes, this document has been revised as follows for the CUDB 1.13 release:

- **Section 2.2 Changes in Infrastructure Support:** Removed section, moved subsections up one level.
- Section 2.2 on page 13: Updated Table 4 with changes in backup and restore procedure and replacement of GEP5 blades with GEP7L blades from CUDB 1.13 onwards.
- Section 2.3 on page 14: Updated Table 5 with changes in backup and restore procedure from CUDB 1.9 and CUDB 1.13 onwards.
- Section 2.3.1 on page 14: Added section, updated Table 6 with Graceful Termination from CUDB 1.13 onwards, and moved former section 6.2.2 VNF Graceful Termination Workflow to Section 2.3.1 on page 14.
- Section 2.3.1.1 on page 15: Added `cudbRemoveNode` command to Table 7.
- Section 2.5 on page 16: Moved CUDB Application Schema Update impact from CUDB 1.12 onwards to CUDB 1.13 onwards in Table 9.
- Section 2.6 on page 17: Added Table 10 and updated with removed tools.
- **Section 2.6.1 Schema Update Tool and Section 2.6.2 CUDB Licensing Fingerprint Tool:** Removed sections, because content is moved to Table 10.
- Section 5.13 on page 54: Added section with Section 5.13.1 on page 54, regarding the removal of the `init` value from `-s` command option from `cudbApplyConfig` command. Added subsections Section 5.13.3 on page 55, regarding the restoration of multiple backups into single destination cluster and Section 5.13.2 on page 55, regarding hardening system improvement.
- Section 6.1.1.1.1 on page 56: Added section and Table 65 with new `cudbManageDsGroup` command.
- Section 6.2 on page 56: Added section regarding geographical redundancy decrease and site decommissioning.
- **Section 6.1 Image Based Instantiation:** Removed section because feature has been delivered and added to Section 4.14 on page 38.
- **Section 6.2 Automatic Installation in Native:** Removed section because feature has been delivered and added to Section 4.15 on page 39.
- **Section 6.2 Automated DSG Expansion:** Removed section because feature has been delivered and added to Section 4.16 on page 39.
- **Section 6.5 GEP7L Support:** Removed section because feature has been delivered and added to Section 4.13 on page 38.



2 General Impact

This section provides information about changes in the system that affect general areas, such as user capacity, network performance, memory consumption, and hardware.

2.1 Capacity and Performance

The capacity tables in the following section are not intended for dimensioning a CUDB system. Moreover, the figures may not reflect the latest updates. For dimensioning purposes, use the Ericsson dimensioning tool, which considers all the parameters and contains the latest figure updates.

Due to the one software track, the following considerations must be taken into account:

- The figures included in the following section are applicable from CUDB 1.12 onwards.
- The figures in Table 3 (Virtualized CUDB (vCUDB)) do not reflect the impact of the multivalued attributes (CUDB 1.8) for LTE and IMS traffic yet.
- The figures in Table 3 (vCUDB) do not reflect the improvement of the Automatic Mastership Change added in CUDB 1.10 yet.
- The figures in Table 3 (vCUDB) do not reflect the improvement of the “Subtree Search Optimization” added in CUDB 1.12 yet.

2.1.1 Subscriber Capacity

The subscriber capacity of CUDB is mainly affected by the following factors:

- The size of the CUDB deployment.
- The individual subscriber memory size (also known as subscriber footprint).
- The processing capacity of the system, affected by the different traffic models and subscriber profiles used by the application Front Ends (FEs), such as the Home Location Register (HLR) and the Home Subscriber Server (HSS).
- The optional CUDB features.

The subscriber capacity values for this CUDB release are shown in Table 1, Table 2, and Table 3. The figures of these tables have been obtained by using the Advanced processing option of the Ericsson default profile tool. The figures were calculated with an IP backbone Quality of Service (QoS) of RTT=40 ms and PLR=10E-4, on a 1+1 CUDB configuration.



The detailed capacity information for default Ericsson profiles on Blade Server Platform (BSP) 8100 with Generic Ericsson Processor version 3 (GEP3) boards is shown in Table 1. Individual operator profile characteristics can vary significantly.

Table 1 Capacity Summary for CUDB Systems Deployed on Native BSP 8100 GEP3 (1+1)

BSP 8100 GEP3	HLR ⁽¹⁾	MNP ⁽²⁾	IMS ⁽³⁾ ₍₄₎	EPC ⁽³⁾⁽⁵⁾	SAPC ⁽²⁾⁽⁶⁾	AAA ⁽²⁾⁽⁷⁾	M2M ⁽²⁾	EIR ⁽²⁾⁽⁸⁾	ENUM ⁽²⁾
Maximum system capacity ⁽⁹⁾	160.4	167.1	89.2	177.1	219.8	221.4	179.8	289.5	273.5
Maximum node capacity ⁽⁹⁾	33.6	167.1	7.1	39.3	76.0	28.0	34.0	141.4	86.2

(1) Default HLR profile.

(2) Estimated figures.

(3) Ericsson default profile.

(4) IMS-fixed BB users.

(5) EPC UDC 16A Traffic model. AVG Authentication. EPC traffic model has changed with the feature Optimized Subtree Searches.

(6) Usage Reporting (BLOB=1,5 KB) and 1 Traffic_ID. No subscriber groups with date and/or priority.

(7) AAA-FE GPRS.

(8) IMEI only. All IMEIs used by the active subscribers are provisioned. BHCI=1.

(9) Million subscribers.

The detailed capacity information for default Ericsson profiles on BSP 8100 with Generic Ericsson Processor version 5 (GEP5) boards is shown in Table 2. Individual operator profile characteristics can vary significantly.

Table 2 Capacity Summary for CUDB Systems Deployed on Native BSP 8100 GEP5 (1+1)

BSP 8100 GEP5	HLR ⁽¹⁾	MNP ⁽²⁾	IMS ⁽³⁾ ₍₄₎	EPC ⁽³⁾⁽⁵⁾	SAPC ⁽²⁾⁽⁶⁾	AAA ⁽²⁾⁽⁷⁾	M2M ⁽²⁾	EIR ⁽²⁾⁽⁸⁾	ENUM ⁽²⁾
Maximum system capacity ⁽⁹⁾	514.3	536.1	286.1	568.1	704.8	710.1	576.7	928.3	877.0
Maximum node capacity ⁽⁹⁾	104.9	536.1	22.2	122.5	236.9	87.3	84.8	324.7	203.7

(1) Default HLR profile.

(2) Estimated figures.

(3) Ericsson default profile.

(4) IMS-fixed BB users.

(5) EPC UDC 16A Traffic model. AVG Authentication. EPC traffic model has changed with the feature Optimized Subtree Searches.

(6) Usage Reporting (BLOB=1,5 KB) and 1 Traffic_ID. No subscriber groups with date and/or priority.

(7) AAA-FE GPRS.

(8) IMEI only. All IMEIs used by the active subscribers are provisioned. BHCI=1.

(9) Million subscribers.

The detailed capacity information for default Ericsson profiles on vCUDB deployments over Cloud Execution Environment (CEE) on BSP 8100 hardware with GEP5 blades is shown in Table 3. Individual operator profile characteristics can vary significantly. The measurements are valid only for vCUDB_16CPU_47GB flavor.



Table 3 Capacity Summary for vCUDB over CEE on BSP 8100 GEP5 (1+1)

vCUDB over CEE on BSP 8100 GEP5 (16 vCPUs)	HLR ⁽¹⁾⁽²⁾	MNP ⁽¹⁾	IMS ⁽¹⁾⁽³⁾	EPC ⁽¹⁾⁽⁴⁾	SAPC ⁽¹⁾⁽⁵⁾	AAA ⁽¹⁾⁽⁶⁾	M2M ⁽¹⁾	EIR ⁽¹⁾⁽⁷⁾	ENUM ⁽¹⁾
Maximum system capacity ⁽⁸⁾	375.4	391.3	208	414.6	514.5	518.3	420.9	667.6	640.1
Maximum node capacity ⁽⁸⁾⁽⁹⁾	76.5	113.3	16.2	57.7	110.5	63.7	46.6	148.6	112

(1) Estimated figures.

(2) Default HLR profile.

(3) IMS-fixed BB users.

(4) EPC UDC 16A Traffic model. AVG Authentication. No LDAP optimization.

(5) Usage Reporting and 1 Traffic_ID. No subscriber groups.

(6) AAA-FE GPRS.

(7) IMEI only. All IMEIs used by the active subscribers are provisioned. BHCI=1.

(8) Million subscribers.

(9) It is considered a full Virtualized Network Function (VNF) with 34 blades for Processing Layer (PL) and Data Store (DS). A full GEP5 cabinet, with CEE installed on top, only allows 30 blades for DS and PL.

Note:

- The maximum node capacity has been calculated for a 1+1 configuration. Consider that system capacity does not scale linearly with the number of nodes.
- From CUDB 1 onwards, CUDB received improvements in Lightweight Directory Access Protocol (LDAP) FE processing that are not clearly visible in the tables above, as the LDAP Front End (LDAP FE) processing capacity is not the limiting factor in such maximum configurations. The maximum system capacity is usually limited by the PL memory, but the maximum node capacity in these 1+1 configurations is limited instead by the DS memory in the HLR, and by the DS processing in the IP Multimedia Subsystem (IMS). However, in most CUDB deployments, LDAP FE capacity is usually the limiting factor, and they will therefore benefit from this improvement. In case of HLR in a 2+2 configuration deployed on BSP 8100 GEP5 hardware, the maximum capacity is increased from 158 million subscribers (or 79 million subscribers per node) on CUDB 16A FD1 to 168 million subscribers (or 84 million subscribers per node) on this CUDB release.
- In case of hybrid CUDB systems (consisting of native GEP3 coexisting with GEP5 nodes, or native nodes coexisting with vCUDB nodes), consider the smaller capacity figures for maximum system capacity (whenever PL memory is the limit). To determine the maximum node capacity, use the Ericsson default profile tool.

2.1.2 Network Performance

No impact.



2.2 Changes in Hardware Support

Hardware related impacts are listed in Table 4.

Table 4 Summary of Changes in Hardware Support

Release	Impact
From CUDB 1 onwards	Maiden installations support BSP 8100 hardware with GEP5 blades only.
	The combination of nodes with different blade types (GEP3 or GEP5) is supported. Hybrid systems, mixing GEP3 nodes and GEP5 nodes, are allowed, except for maiden installations, but mixed GEP3 and GEP5 blades within the same node are not supported.
	The minimum number of Processing Layer Database (PLDB) blades supported is 2 (the previous value is 4). ⁽¹⁾
From CUDB 1.4 onwards	Hardware migration from GEP3 to GEP5 based on backup and restore is provided.
From CUDB 1.6 onwards	Hardware migration procedure based on expansion, reallocation and decommission is supported.
From CUDB 1.13 onwards	Hardware migration from GEP3 to GEP5 through backup and restore procedure now supports restoration of multiple backups into a single destination cluster. Replacement of GEP5 blades with Generic Ericsson Processor version 7, Low Power (GEP7L) blades is supported in native systems. See Section 4.13 on page 38 for further details.

(1) Refer to CUDB Node Configuration Data Model Description, Reference [2] for more information.

2.3 Changes in Cloud Support

Cloud support related impacts are listed in Table 5.

Table 5 Summary of Changes in Cloud Support

Release	Impact
From CUDB 1 onwards	vCUDB is verified to run on the CEE, on BSP 8100 hardware with GEP5 blades, and is supported for maiden installations only. Support for other virtualized environments or hardware is possible through an integration project only.
From CUDB 1.6 onwards	A TCP-based message system replaces the usage of multicast traffic in the cloud infrastructure.
From CUDB 1.9 onwards	Migration to vCUDB through backup and restore is provided.
From CUDB 1.12 onwards	Virtual Machine (VM) evacuation is supported and verified on CEE.
	VM evacuation is supported and verified on CEE.
	vCUDB is verified on CEE, over HDS 8000 CSU 0.2 hardware.
From CUDB 1.13 onwards	Migration to vCUDB through backup and restore procedure now supports restoration of multiple backups into a single destination cluster.

2.3.1 Changes in VNF Workflows

CUDB supports the workflows listed in Table 6 on the full Ericsson cloud infrastructure (ECEE on top of BSP 8100). Refer to CUDB VNF Lifecycle Management, Reference [4] for more information.



Table 6 Summary of Changes in VNF Workflows

Release	Impact
From CUDB 1.9 onwards	<ul style="list-style-type: none"> • Instantiation workflow introduced. • Termination (forceful) workflow introduced. See Section 4.14 on page 38 for more information.
From CUDB 1.12 onwards	<ul style="list-style-type: none"> • Upgrade Preparation workflow introduced. • Upgrade workflow introduced. See Section 2.5 on page 16 for more information.
From CUDB 1.13 onwards	<ul style="list-style-type: none"> • Termination workflow enhanced (graceful). See Section 6.1.1 on page 55 for more information.

2.3.1.1 VNF Graceful Termination Workflow

This workflow allows automatic decommissioning of vCUDB VNFs. The graceful termination workflow is part of the VNF package to be executed according to [CUDB VNF Lifecycle Management, Reference \[4\]](#) in the OSS-RC/ENM.

2.3.1.1.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

Commands and Command Options

Table 7 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 7 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbRemoveNode	<ul style="list-style-type: none"> • -h --help • -v --verbose • --no-prompt 	New command restricted to Ericsson personnel.

2.3.2 Changes in VMware Support

VMware support related impacts are listed in Table 8.



Table 8 Summary of Changes in VMware Support

Release	Impact
CUDB 1.10	vCUDB software compliant package is certified on VMware vSphere 6.5 and vCloud Director for Service Provider 8.20.
CUDB 1.12	vCUDB software compliant package is certified, VM evacuation and VM migration are supported and verified on VMware vSphere 6.5 and vCloud Director for Service Provider 8.20.

2.4 Changes in Software Handling

No impact.

2.5 Changes in Upgrade Procedure

Upgrade procedure related impacts are listed in Table 9.

Table 9 Summary of Changes in Upgrade Procedure

Release	Impact
From CUDB 1 onwards	The Electronic Software Licenses function performs licensing-related activities during the upgrade, such as getting digital fingerprints on every node in the system and requesting License Key Files from Ericsson Sourcing and Supply.
	During the software upgrade procedure, the Hardware Monitoring function is disabled on the node currently being upgraded.
	During the upgrade procedure, and before it is fully completed, the LDAP proxy traffic sent from CUDB nodes that have not been upgraded is synchronous, while the LDAP proxy traffic sent from already upgraded CUDB nodes is asynchronous.
From CUDB 1.1 onwards	The Installation Based Upgrade method, based on maiden installation, is introduced.
	If the CUDB system has custom modifications in the sudoers files, the modifications will not be adapted automatically after the upgrade process has been completed, because the CUDB upgrade does not have any means to know what custom modifications are still supported in the new version. The upgrade process checks, during the System Validation phase, if the sudoers file is different from the standard CUDB configuration, and if it is the case, it displays a warning message and the sudoers file is copied to the cudbUpgradeWorkDir for later use. After the upgrade process has been completed, the sudoers file needs to be updated manually with the applicable content from the sudoers file located in cudbUpgradeWorkDir.
From CUDB 1.4 onwards	The number of defined SITE_VIP addresses may decrease after upgrade from previous releases due to the application of the new formula for calculating this value.
From CUDB 1.6 onwards	The upgrade is improved with combined hardware and software upgrade procedure. See Section 4.7 on page 34 for more details.
	The upgrade on vCUDB is supported. See Section 4.8 on page 34 for more details.
From CUDB 1.7 onwards	A new upgrade path from 16A FD1 CP1 is available. It is not possible to upgrade from 16A FD1 CP1 to any previous CUDB 1.x version.
From CUDB 1.8 onwards	The upgrade to hybrid CUDB systems, consisting of native and vCUDB nodes, is possible. See Section 3.7 on page 23 for more details.
From CUDB 1.11 onwards	During upgrade procedure, the Automatic Mastership Change Improvements are disabled.
From CUDB 1.12 onwards	System init phase disappears as it has been integrated as a part of first node upgrade phase.
From CUDB 1.13 onwards	CUDB Application Schema Update, Reference [3] is an independent procedure out of the upgrade/hardware migration. A new command has been created to provide the existing support and guarantee the backwards compatibility.



2.6 Changes in Tools

Tools related changes are listed in Table 10.

Table 10 Summary of Changes in Tools

Release	Impact
From CUDB 1 onwards	Running the Schema Update Tool on the System Controllers (SCs) of the CUDB system is recommended (but not required). If the Schema Update Tool is executed elsewhere, check the version of the shared libraries required for the slapd process to determine if the Linux version of the current machine is sufficient for executing the tool.
From CUDB 1.10 onwards	A new tool is included to generate the fingerprints needed to request License Key Files to Ericsson Sourcing and Supply. This tool is meant to be used separately from the CUDB installation or upgrade procedures. See Section 5.10.2 on page 52 for more information.
From CUDB 1.13 onwards	<p>The following CUDB tools are removed:</p> <ul style="list-style-type: none"> • CUDB Configuration Checking Tool • CUDB Initial Configuration Creation Tool

2.7 Obsolete Functions

From CUDB 1 onwards, the Subscription Control function is obsolete.

2.8 Other Network Elements (Dependencies)

To achieve full capacity at User Data Consolidation (UDC) solution level of the Key Performance Indicators (KPIs) function introduced in CUDB 1.1, Network Management System (NMS) and User Profile Gateway (UPG) support is needed.

All the changes in CUDB Fault Management and Performance Management are backward compatible with the Operations Support System for Radio and Core (OSS-RC) or Ericsson Network Manager (ENM) interfaces.

The minimum version of Ericsson NMS required to support CUDB VNF Lifecycle Management, Reference [4] is:

- OSS-RC including VNF-LCM 17.14 or higher.
- ENM including VNF-LCM 17.14 or higher.



3 New Functions

3.1 Virtualized Network Function Support

This function makes it possible to decouple software and hardware through virtualization, thereby enabling the harmonization of hardware across multiple products and vendors, and the optimization of hardware utilization.

The support of virtualization in CUDB covers the installation, configuration, and adaptation of CUDB Operation and Maintenance (OAM) functions. A vCUDB system provides the same functions and architecture as a native CUDB system.

3.1.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.1.1.1 Alarms

Table 11 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm Operating Instructions (OPIs) for detailed information about the alarms.

Table 11 Summary of New and Modified Alarms

Alarm	Impact
Control, Blackboard Coordination Server Down	Modified alarm
LDAP Front End, Server Down	Modified alarm
Operating System, Disk Usage Too High	Modified alarm
Storage Engine, Automatic Handling of Network Isolation not Completed for DS	Modified alarm
Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB	Modified alarm
Storage Engine, DS Cluster Node Down	Modified alarm
Storage Engine, PLDB Cluster Node Down	Modified alarm

3.1.1.2 Logging

New and modified logging events are included due to impacts in the following components:

- Cluster Supervisor (CS)
- LDAP FE Monitor



Refer to [CUDB Node Logging Events](#), Reference [6] for more information on logging.

3.2 Electronic Software License

The Electronic Software License function requires to perform licensing-related activities during the upgrade, such as getting digital fingerprints on every node in the system and requesting License Key Files from Ericsson Sourcing and Supply.

3.2.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.2.1.1 Alarms

Table 12 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide](#), Reference [5] and the related alarm OPIs for detailed information about the alarms.

Table 12 Summary of New and Modified Alarms

Alarm	Impact
Licensing, Autonomous Mode Activated, License Management	New alarm
Licensing, Capacity Usage Threshold Reached, License Management, Major	New alarm
Licensing, Capacity Usage Threshold Reached, License Management, Warning	New alarm
Licensing, Emergency Unlock Reset Key Required, License Management	New alarm
Licensing, Key File Fault, License Management	New alarm
Licensing, License Key Not Available, License Management, Major	New alarm
Licensing, License Key Not Available, License Management, Minor	New alarm
Licensing, License Management Not Available, License Management	New alarm
Licensing, Number of Profile Subscriptions has Reached the Purchased Number, Subscriptions Control	Removed alarm

3.2.1.2 Commands and Command Options

Table 13 describes the new, modified, and removed Command Line Interface (CLI) commands and command options. Refer to [CUDB Node Commands and Parameters](#), Reference [7] for more information.



Table 13 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbLicensingTool	<ul style="list-style-type: none">• -c --calculate-fingerprint• -h --help• -r --restore-fingerprint• -u --upgrade	New command restricted to Ericsson personnel.

3.2.1.3 Logging

The following new component writing on the logs has been included in the CUDB system:

— LDAP Counters

New and modified logging events are included due to impacts in the following components:

— DataBackupRestore

— Reconciliation

Only important events are logged. Successful operations are no longer logged into the ldap logs.

Refer to [CUDB Node Logging Events, Reference \[6\]](#) for more information on logging.

3.3 LDAP Data Views

This function makes it possible for applications to access the data stored in CUDB through a custom Directory Information Tree (DIT) and a custom schema. LDAP users can be configured to access CUDB either by using the “native” view and core DIT, or by using one of the defined LDAP data views.

3.3.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.3.1.1 Data Model

Table 14 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.



Table 14 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLdapUser	cudbLdapViewId	Attribute used as the identifier of the LDAP view attached to the specific user for the LDAP Data Views function. CudbLdapUser::cudbLdapViewId must be equal to one CudbLdapView::ldapViewName.
CudbLdapView	cudbLdapViewId	Attribute uniquely identifying LDAP view for the LDAP Data Views function.
CudbLdapView	ldapViewName	New attribute representing the name of unique LDAP view for the LDAP Data Views function.

3.4 Local Reads

This function allows data to be read from the closest DS replica. It is activated by setting `readModeInDS` in and LDAP user or via LDAP control, only if the Deployment Flexibility Value Package is available.

3.4.1 Changes in Interfaces

Table 15 describes interface changes between the existing and new revisions of the product.

Table 15 Summary of New, Modified, and Removed CUDB Interfaces

Protocol	Nodes	Impact
LDAP LDAP v3	CUDB	Implemented a new LDAP Control ReadMode applicable only for search operations to override the default read mode in PL and DS.

3.4.2 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.4.2.1 Counters

The following new counters have been introduced:

- `processedLocalReadsLocalNode`
- `processedLocalReadsOtherNodesInSite`
- `processedLocalReadsRemoteSites`

Refer to [CUDB Counters List](#), Reference [8] for more information.



3.4.2.2 Data Model

Table 16 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 16 Summary of New and Modified CUDB Configuration Objects and Attributes

Class	Attribute	Impact
CudbSystem	localReadsDSReplicationDelayThreshold	This attribute defines the maximum threshold (in seconds) for replication delay value, which is used to determine if the slave replica is too far behind the master replica. If the slave replica is too far behind, the data will not be read locally, even if DS read mode is set to Local Preferred. ⁽¹⁾
CudbLdapUser	localReadsDsReplicationDelayThreshold	If provided, the value in this attribute is used to override the value of localReadsDSReplicationDelayThreshold attribute of the CudbSystem class for an ldap user.

(1) This applies only to users that have DS read mode set to Local Preferred.

3.5 Commercial UDC IoT Offering

The feature introduces support for new Internet of Things (IoT) Profile License into the CUDB.

This enables CUDB to offer competitive licensing for data storage of IoT subscriptions as part of dedicated UDC IoT deployments for massive IoT devices (for example, related to smart cars, smart metering, and so on).

3.5.1 Changes in Licensing

This function requires to create a new capacity license for new UDC IoT dedicated deployments.

3.5.2 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.5.2.1 Alarms

Table 17 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 17 Summary of New and Modified Alarms

Alarm	Impact
Licensing, License Key Not Available, License Management, Major	Modified alarm



Table 17 Summary of New and Modified Alarms

Alarm	Impact
Licensing, Capacity Usage Threshold Reached, License Management, Major	Modified alarm
Licensing, Capacity Usage Threshold Reached, License Management, Warning	Modified alarm

3.6 Support for Static Routing

This new function enables CUDB deployment on cloud infrastructures that do not support route supervision from the routers towards the VNFs.

3.6.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.6.1.1 Commands and Command Options

Table 18 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 18 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbEvipEncapsulator	-b --blade	Modified command option restricted to Ericsson personnel.

3.7 Smooth Migration to Virtualized CUDB

Allows to migrate a native CUDB system to a virtualized one following the below steps:

- the expansion of a native CUDB system with vCUDB nodes as part of the CUDB System Expansion procedure.
- the migration of a native CUDB system to a vCUDB system as part of CUDB Hardware Migration through Subscription Reallocation procedure.

3.7.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.



3.7.1.1 Commands and Command Options

Table 19 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 19 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbReallocate	--force	New command option to force reallocation if blocked.
		Modified command behavior to block reallocation when DS Unit Group (DSG) is disabled for the provisioning of Distribution Entries (DEs).
		Updated command output.

3.8 Migration to Virtualized CUDB through Backup and Restore

Migration of a native CUDB system to a virtualized one is possible through the Backup and Restore procedure.

3.9 Support for HSS-EPC 5G Profiles

The feature introduces support for HSS-EPC 5G profiles in CUDB.

This enables CUDB to offer licensing for data storage of HSS-EPC 5G subscriptions.

3.9.1 Changes in Licensing

This function requires to add a new capacity license for Base Package profile.

HSS-EPC 5G license acts as an add-on on top of HSS-EPC license, so both are required for HSS-EPC 5G subscriptions.

3.9.2 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.9.2.1 Alarms

Table 20 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.



Table 20 Summary of New and Modified Alarms

Alarm	Impact
Licensing, License Key Not Available, License Management, Major	Modified alarm. Additional Resource ID suffix has been added to support HSS-EPC 5G Profile license.
Licensing, Capacity Usage Threshold Reached, License Management, Major	Modified alarm. Additional Resource ID suffix has been added to support HSS-EPC 5G Profile license.
Licensing, Capacity Usage Threshold Reached, License Management, Warning	Modified alarm. Additional Resource ID suffix has been added to support HSS-EPC 5G Profile license.

3.10 Optimized Subtree Searches

This function increases the performance of preconfigured sub-tree LDAP searches associated to specific LDAP users, reducing the response time of these requests and consequently increasing LDAP processing capacity.

Optimized search narrows down the scope of the search and allows CUDB to optimize the query towards the storage engine instead of performing a whole sub-tree scan. When an LDAP sub-tree search is not configured, the function has no effect and a complete search is performed without optimization.

3.10.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

3.10.1.1 Data Model

Table 21 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 21 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLdapUser	subtreeSearchConfigName	Modified class. New attribute used as the identifier of the configured Optimized Search instance attached to the specific user. CudbLdapUser::subtreeSearchConfigName must be equal to one CudbSubtreeSearchConfig::subtreeSearchConfigName.
CudbSubtreeSearchMgmt	cudbSubtreeSearchMgmtId	New class. New attribute uniquely identifying the instance of this class.
CudbSubtreeSearchConfig	cudbSubtreeSearchConfigId	New class. New attribute uniquely identifying the instance of this class.
	subtreeSearchConfigName	New attribute specifying the name of the unique CudbSubtreeSearchConfig.



4 New Enhanced Functions

This section describes the new enhanced functions of this CUDB release. Refer to the Functions section of [CUDB Technical Product Description, Reference \[1\]](#) for more information on these functions.

4.1 Flexible PL Deployment

This is an enhancement to the CUDB Global Access and the System and Node Architecture functions.

When activated, the enhancement requires a new network design, as nodes without a PLDB blade or VM cannot receive direct traffic from application FEs.

4.1.1 Changes in Interfaces

Table 22 describes interface changes between the existing and new revisions of the product.

Table 22 Summary of New, Modified, and Removed CUDB Interfaces

Protocol	Nodes	Impact
LDAP LDAP v3	All application FEs	<p>The LDAP interface received new conditions and error messages for <code>Error Code 52</code>. Error 52 can also be raised when application FEs send direct traffic to a node without PLDB.</p> <p>If alias entry (or alias present in entry path) is pointing to a non-existing entry, error will be 33 instead of 32.</p> <p>Error code 11 is changed to error 80 for maximum number of threads reached for a DS and maximum number of threads reached for connection.</p> <p>Error code 3 returned for timed out proxy search operations is changed to error code 11 in those cases where the proxy operation was caused by exceeding the value of the timeout set by the LDAP FE (if the timeout set by the LDAP client is smaller than the one set by the LDAP FE in the proxy operation and the operation timed out, the operation will return <code>err=3</code>). Refer to CUDB LDAP Interwork Description, Reference [10] for further details.</p>

4.1.2 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.1.2.1 Commands and Command Options

Table 23 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.



Table 23 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbClusterConfConverter		New command restricted to Ericsson personnel.
cudbEvipConfigExtension	-d --dsg and -b --blade	Modified command option restricted to Ericsson personnel.
	-r --removePLDB	New command option restricted to Ericsson personnel.
cudbPrepareStore		Modified command to also support nodes without PLDB.
cudbReallocate		Updated command output.
cudbSwBackup	-f --force	Modified command option to allow software restore also when the CUDB node does not have a defined PLDB cluster.
cudbSystemStatus		Modified command output. PLDB sections are not included in the output if the node contains no PLDB.

4.1.2.2 Data Model

Table 24 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 24 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLocalDs	cudbLocalDsId	Modified attribute. The value range of cudbLocalDsId is 1-17 if the CudbLocalNode class containing the CudbLocalDS object has no CudbLocalPl object created.
CudbLocalPl		Modified class. The CudbLocalPl class is optional.
CudbRemoteDs	cudbRemoteDsId	Modified attribute. The value range of cudbRemoteDsId is 1-17 if the CudbLocalNode class containing the CudbRemoteDs object has no CudbRemotePl object created.
CudbRemotePl		Modified class. The CudbRemotePl class is optional.

4.1.2.3 Logging

The following new component writing on the logs has been included in the CUDB system:

- License Manager



New and modified logging events are included due to impacts in the following components:

— Configuration Management

Refer to [CUDB Node Logging Events, Reference \[6\]](#) for more information on logging.

4.2 OAM Automation with NETCONF Support

This is an enhancement to the OAM CUDB function.

4.2.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.2.1.1 Commands and Command Options

Table 25 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 25 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbApplyConfig	-n --noimmsave	Removed command option.
	-s --scope all	Deprecated command, replaced by the applyConfig administrative operation of the CudbLocalNode class.
cudbUpdateUserInfo		Deprecated command, replaced by the updateUserInfo administrative operation of the CudbLocalNode class. Also modified to support refreshing CUDB LDAP users from a remote PLDB.

4.2.1.1.1 Administrative Operations

Table 26 describes the changes in the administrative operations of the CUDB system. Refer to the Administrative Operations section of [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 26 Summary of New, Modified, and Removed Administrative Operations

Class	Administrative Operation	Impact
CudbLocalNode	applyConfig	New administrative operation replacing the deprecated cudbApplyConfig command, used to activate configuration changes.



Table 26 Summary of New, Modified, and Removed Administrative Operations

Class	Administrative Operation	Impact
CudbLocalNode	updateUserInfo	New administrative operation replacing the deprecated cudbUpdateUserInfo command, used to update user information in the node.
CudbLocalNode	cancelApplyConfig	New administrative operation restricted to Ericsson personnel.

4.2.1.2 Data Model

Table 27 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.



Table 27 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLocalNode	applyConfigStatus	<p>New read-only attribute that stores the following information about the progress of the asynchronous applyConfig administrative action:</p> <ul style="list-style-type: none">• actionId• actionName• additionalInfo• progressInfo• progressPercentage• result• resultInfo• state• timeActionStarted• timeActionCompleted• timeOfLastStatusUpdate
CudbLocalNode	updateUserInfoStatus	<p>New read-only attribute that stores the following information about the progress of the asynchronous updateUserInfo administrative action:</p> <ul style="list-style-type: none">• actionId• actionName• additionalInfo• progressInfo• progressPercentage• result• resultInfo• state• timeActionStarted• timeActionCompleted• timeOfLastStatusUpdate

4.3 Increment Alert Key Command

This is an enhancement to the CUDB Global Access and the System and Node Architecture functions.

4.3.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.



4.3.1.1 Commands and Command Options

Table 28 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 28 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbLdapFeRestart	--with-monitor	Deprecated command option.
	--no-prompt	New command option restricted to Ericsson personnel.
cudbManageStore	--no-prompt	New command option restricted to Ericsson personnel.
cudbSetDsgMaster	--no-prompt	New command option restricted to Ericsson personnel.
cudbSwBackup	--no-prompt	New command option restricted to Ericsson personnel.
	-r	Deprecated command option.
cudbSystemDataBackupAndRestore	--no-prompt	New command option restricted to Ericsson personnel.
	-r	Deprecated command option.
cudbUnitDataBackupAndRestore	--no-prompt	New command option restricted to Ericsson personnel.

4.4 CUDB Key Performance Indicators

This is an enhancement to the OAM CUDB function.

CUDB KPIs are a special set of CUDB counters, for CUDB systems deployed on native BSP 8100, that help the users evaluate and quantify the usage of the processing and memory capacity of certain CUDB resources.

4.4.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.4.1.1 Commands and Command Options

Table 29 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.



Table 29 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbHaState		Additional printouts were included due to the introduction of KpiCentral process. Example: saAmfSISUHASState."safSu=SC-2,safSg=2N,safApp=ERIC-CUDB_KPICENTRAL". "safSi=2N-1": active(1)
cudbSystemStatus	-p --check-cudbprocess	KpiCentral process was added to the output when listing processes running on OAM blades. Example: KpiCentral process.....Running in: OAM2

4.4.1.2 Data Model

Table 30 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 30 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLocalNode	cudbCounterPublishingPeriod	New attribute used to change the frequency of Performance Management (PM) report file generation.

4.4.1.3 Counters

The following new counters have been introduced:

- kpiClusterLoad
- kpiRatioDroppedCluster
- kpiLdapFeLoad
- kpiRatioDroppedLdap

Refer to [CUDB Counters List, Reference \[8\]](#) for more information.

4.4.1.4 Logging

The following new component writing on the logs has been included in the CUDB system:

- CUDB KPIs



Refer to [CUDB Node Logging Events, Reference \[6\]](#) for more information on logging.

4.5 SOAP Notifications Improvements

This is an enhancement of the Simple Object Access Protocol (SOAP) notifications function. It enables and simplifies SOAP notification events configuration by allowing to monitor sets of LDAP entries configuring in a single notification event. It helps to reduce the number of configured notification events and therefore to optimize CUDB Notification resources. With the enhancement, it will be possible to configure Portable Operating System Interface (POSIX) extended regular expressions in the dn associated to `CudbNotificationObjectClass` classes of type `monitor` or `monitorAll`. The dn attribute can be configured with the full Distinguished Name (DN) of the entry.

4.5.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.5.1.1 Data Model

Table 31 describes the changes in the configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 31 Summary of New, Modified, and Removed CUDB Configuration Objects and Attributes

Object	Attribute	Impact
<code>CudbNotificationObjectClass</code>	<code>dn</code>	<ul style="list-style-type: none">Modified attribute. The dn attribute can contain the partial or full DN of the attribute or object to be monitored.The DN can be configured using POSIX extended regular expressions.
<code>CudbNotificationEvent</code>	<code>numberOfSoapThreads</code>	New restricted attribute defining the number of SOAP threads to start for a specific notification event.

4.6 Asynchronous LDAP Proxy

This is an enhancement to the asynchronous LDAP proxy function that allows releasing resources in a CUDB node until a response for a proxied LDAP operation is received. The LDAP FE can wait for the response, asynchronously handling the queue of pending operations. As a result, the maximum traffic capacity of the node is increased.

The benefits are the following:



- Increases CUDB node capacity therefore decreasing the need for hardware resources.
- Reduces the probability of overload situations.
- Decouples CUDB capacity from IP backbone delay.
- Increases CUDB node capacity by increasing its proxy traffic processing capacity.

This feature modifies the formula for calculating the number of SITE_VIP addresses due to the increase of node traffic capacity. Refer to the Multiple SITE_VIPs section of [CUDB Node Network Description](#), Reference [9] for more information. As a consequence, the number of defined SITE_VIP addresses may decrease after upgrade from previous releases.

4.7 CUDB Combined Hardware and Software Upgrade Procedure

This is an enhancement to the software upgrade function in CUDB 1.6. The simplified hardware migration from EBS 1.0 or EBS 2.0 to BSP 8100 is a more flexible procedure and supports more customer adaptations.

4.8 Virtualized CUDB Adaptation Framework

This is an enhancement to the software upgrade function and it allows the upgrade of vCUDB systems.

4.9 Subscription Reallocation Improvement

This is an enhancement to the Subscription Reallocation function. It enables faster reallocation of the stored data by packing together all the data related to a particular subscription and moving them in a single LDAP operation. With this enhancement, it is possible to run one `cudbReallocate` command on each SC separately in the node hosting the PLDB master. To get the benefits of the enhanced Subscription Reallocation function, both node hosting DSG from where data is reallocating and node hosting DSG to where data is reallocating, need to be on the software level supporting enhancements.

4.9.1 Changes in Interfaces

Table 32 describes interface changes between the existing and new revisions of the product.



Table 32 Summary of New, Modified, and Removed CUDB Interfaces

Protocol	Nodes	Impact
LDAP v3	All application FEs	<p>The error message for code 80 Distribution entry is locked is changed to CUDB lock due to Reallocation.</p> <p>A new branch 'ou=dsgLocks,{root dn}' is added due to the improved locking mechanism. This branch is used solely for the internal mechanism of the subscription reallocation, to mark entries being reallocated as locked and forbid modification until their movement is completed.</p>

4.9.2 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.9.2.1 Command and Command Options

It is possible to run a `cudbReallocate` command on each SC separately in the node hosting the PLDB master, so two reallocation processes can run in parallel in a CUDB system. Refer to the Configuring Subscription Reallocation section of *CUDB System Administrator Guide*, Reference [15] for more information.

Command output has been changed. Refer to the Output section of *CUDB Node Commands and Parameters*, Reference [7] for more information on the output of the `cudbReallocate` command.

Table 33 describes the new, modified, and removed CLI commands and command options. Refer to *CUDB Node Commands and Parameters*, Reference [7] for more information.

Table 33 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
<code>cudbReallocate</code>	<code>-n --nthreads</code>	Command option restricted to Ericsson personnel.

4.10 Automatic Mastership Change Improvements

This is an enhancement of the Automatic Master Change (AMC) function that intends to improve the system capacity under situation of degradation in master replicas.

A smooth mastership change is attempted in case the master replica is degraded.

This enhancement improves the footprint in dimensioning exercises in which DSG processing is the bottleneck, since both blades can always be counted during the dimensioning exercise.



Refer to the Automatic Mastership Change when Master Replica is Degraded section of [CUDB High Availability, Reference \[13\]](#) for more information.

4.10.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.10.1.1 Command and Command Options

Table 34 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 34 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Impact
cudbDsgMastershipChange	Command output is modified to show a warning in case the master is manually moved to a degraded replica.

4.11 Additional High-Throughput Write Requests

This is an enhancement to the LDAP operations in CUDB. LDAP interface efficiency is increased by allowing grouping several related write operations (Add, Delete, Modify) into a single LDAP request. Refer to [CUDB LDAP Interwork Description, Reference \[10\]](#) for more information.

4.11.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.11.1.1 Counters

The following new counters have been introduced:

- `effectiveLdapOperations`
- `effectiveLdapTpsAtFrontEndn`

Refer to [CUDB Counters List, Reference \[8\]](#) for more information.

4.12 IPv6 Support in CUDB

This is an enhancement to the CUDB external address configuration. IPv6 is supported only for new installations.



Upgrade from IPv4 deployment and dual stack, that is the combination of IPv4 and IPv6 addresses, are not supported.

Refer to [CUDB Node Network Description](#), Reference [9] for more information.

4.12.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.12.1.1 Data Model

Data type of attributes representing external IP addresses in CUDB node configuration model is changed to `IpDNSAddress` that allows configuration of addresses in IPv4 or IPv6 format. This change does not affect configuration of nodes with IPv4 addresses.

Table 35 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description](#), Reference [2] for more information.

Table 35 Summary of New, Modified, and Removed CUDB Configuration Objects and Attributes

Class	Attribute	Impact
CudbExternalAuthServer	<ul style="list-style-type: none"> primaryServer secondaryServer 	Data type is changed to IpDNSAddress.
CudbExternalLogServer	<ul style="list-style-type: none"> externalLogServerIp 	Data type is changed to IpDNSAddress.
CudbLocalNode	<ul style="list-style-type: none"> cudbVIP oamVIP trafficVIP 	Data type is changed to IpDNSAddress.
CudbRemoteNode	<ul style="list-style-type: none"> cudbVIP oamVIP trafficVIP 	Data type is changed to IpDNSAddress.
CudbTrafficBlockingRule	<ul style="list-style-type: none"> blockedVIP 	Data type is changed to IpDNSAddress.

4.12.1.2 Alarms

Table 36 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide](#), Reference [5] and the related alarm OPIs for detailed information about the alarms.

Table 36 Summary of New and Modified Alarms

Alarm	Impact
Security, OAM User Exceeded Number Of Failed Logins	Modified alarm. Alarm Active Description attribute is updated.



Table 36 Summary of New and Modified Alarms

Alarm	Impact
Security, OAM User Gaining Privilege Failed	Modified alarm. Alarm Active Description attribute is updated.
Security, OAM User Privilege Raise To Root Failed	Modified alarm. Alarm Active Description attribute is updated.
Security, Root Login Failed	Modified alarm. Alarm Active Description and Resource ID attributes are updated to support IPv6 addresses.
Control, Blackboard Coordination Server Down	Modified alarm. Alarm Active Description and Resource ID attributes are updated to support IPv6 addresses.

4.13 GEP7L Support

Replacement of GEP5 blades with GEP7L blades in native systems is supported ensuring:

- Coexistence GEP5 – GEP7L in same cabinet. Faulty GEP5 boards can be replaced by GEP7L boards.
- Node coexistence GEP5 - GEP7L in the same CUDB system.

4.13.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.13.1.1 Logging

New and modified logging events are included due to impacts in the following components:

- Software Management (SW_Mgmt)

Refer to [CUDB Node Logging Events](#), Reference [6] for more information on logging.

4.14 Image Based Instantiation

CUDB allows deployment based on images created offline. Image supports customer configuration injection after deployment.

4.14.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.



4.14.1.1 Commands and Command Options

Table 37 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 37 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbAutomatedInstall	-c --check	New command restricted to Ericsson personnel.
	-f --full_system_check	
cudbEvipConfigExtension	-i --install	Modified command option restricted to Ericsson personnel.
cudbPrepareInstallConfig ⁽¹⁾	-g --generate	New command restricted to Ericsson personnel.
	-v --validate	
	-e --expansion	

(1) The command is also valid for Automatic Installation in Native.

4.15 Automatic Installation in Native

CUDB supports automatic installation enabling the upload and configuration of the software, thus minimizing manual intervention and reducing the possibility of human errors.

4.15.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

4.15.1.1 Commands and Command Options

Table 38 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 38 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbAitDeploy	-c	New command restricted to Ericsson personnel.

4.16 Automated DSG Expansion

CUDB supports the addition of a new DS in a partially automated way. The servers assigned to the database cluster hosting DS data in a CUDB system are



expanded automatically, thus minimizing manual intervention and reducing the possibility of human errors.

5 System Improvements

This section describes updates to the CUDB system.

5.1 Improvements in CUDB 1

5.1.1 Interface Improvements

Table 39 describes the interface changes between the existing and new revisions of the product.

Table 39 Summary of New, Modified, and Removed CUDB Interfaces

Protocol	Nodes	Impact
LDAP LDAP v3	All application FEs	Deleting parent entries of DEs is not allowed and results in Error Code 53 with the text message: Deleting parent of distribution entry is not allowed. ⁽¹⁾ Example of parent entries that cannot be deleted: ou=multiSCs,dc=<root entry>, ou=association,dc=<root entry> Asynchronous LDAP communication between CUDB nodes (in the previous version it was synchronous).
LDAP LDAP v3	CUDB	Implemented new LDAP Control TimestampBasedConditionalUpdate for extended LDAP modify and delete operations, used internally by the Data Repair process.

(1) Already included in 16A FD1 CP1.

5.1.2 OAM Improvements

Table 40 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.



Table 40 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbCheckConsistency	-o --object-tables ⁽¹⁾	New command option used to check and report any difference between the OBJECT_CLASSES and MULTI_VALUE_OBJECTS tables.
cudbConsistencyMgr	--max-replica-lag ⁽¹⁾	Modified command option, default value changed to 10000.
cudbDsgMastershipChange		Modified the mastership change logic of the command. In case the destination node has a PLDB slave that is unable to synchronize with its master, then the mastership change request will be rejected. The --force option overrides this behavior.
cudbManageBCServer	-help	Removed command option.
cudbRemoteTrust	-b --banner	New command option used to disable the legal warning banner for internal CUDB logins.

(1) Already included in 16A FD1 CP1.

Table 41 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 41 Summary of New, Modified, and Removed CUDB Configuration Objects and Attributes

Class	Attribute	Impact
CudbLdapAccess	ldapRootPassword ⁽¹⁾	MySQL and LDAP root passwords can contain only ASCII alphabetic characters, numeric digit characters, and the following symbols: , - % = ? + ~ _
CudbTrafficControlManager		New class serving as the container of the traffic blocking rules.
CudbTrafficBlockingRule		New class used to block access to certain CUDB VIPs or services running on certain CUDB VIP ports. It is used to replace the existing procedure for node isolation.

(1) Already included in 16A FD1 CP1.

5.1.2.1 Logging

New and modified logging events are included due to impacts in the following components:

- CountersFw
- Fault Management
- Security

Refer to [CUDB Node Logging Events, Reference \[6\]](#) for more information on logging.



Note: Consider the following changes related to logging:

- All application-related logging events in CUDB are reported using Linux `rsyslog` instead of `syslog-ng`. Refer to [RFC 3195: Reliable Delivery for syslog](#), Reference [17] for more information.

5.1.3 Notification Support Improvements

CUDB supports outbound notifications, so whenever a piece of data is modified in a subscriber profile, CUDB can send SOAP based notifications towards the corresponding application FE.

5.1.3.1 Impact

The notifications process runs on all blades of the node.

5.1.4 Security Improvements

The following changes improve security functions:

- MySQL and LDAP root passwords can contain only ASCII alphabetic characters, numeric digit characters, and the following symbols: `, -%=?+~_`

For more information, refer to the Configuring Password Strength and Changing the Password of the rootdn User sections of *CUDB Security and Privacy Management*, Reference [11].

- Security is enhanced with a new, more restrictive `umask` (027). When a user creates a file, the new `umask` is applied, restricting the visibility of these files to fewer users.

5.2 OAM Improvements in CUDB 1.1

Table 42 describes the new, modified, and removed CLI commands and command options. Refer to *CUDB Node Commands and Parameters*, Reference [7] for more information.

Table 42 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
<code>cudbInstall</code>		Modified command restricted to Ericsson personnel.
<code>cudbMpStat</code>		This command is restricted to Ericsson personnel.



Table 42 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbReplicaRepair		Modified command to execute extended LDAP modify or delete operations with the TimestampBaseConditionalUpdate LDAP Control during the Data Repair process.
cudbSystemStatus	-p --check-cudbprocess	Error status of CS process provides additional information related to reporting status in Blackboard Coordination (BC) Cluster.

5.3 Improvements in CUDB 1.2

5.3.1 LDAP Data Views

The cudbCheckLdapViewMapping checking tool has been improved with the -v optional parameter to get verbose error messages.

5.3.2 OAM Improvements

Table 43 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 43 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSystemDataBackupAndRestore	-R	Deprecated command option.



Table 43 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSystemStatus	-b --bc-status	This command option is restricted to Ericsson personnel.
	-B --new-bc-status	<p>New command option to print the status of the BC process. The output is the Node ID and application designations (OAM1, OAM2, and DS2_0 DS1_0 PL2, depending on PLDB deployment) instead of Node CUDB VIP address and Linux Open Telecom Cluster (LOTIC) designations.</p> <p>Example:</p> <pre>[Site 1] SM leader: Node 10 OAM1 Node 10 BC server in OAM1 running BC server in OAM2 running (Leader) BC server in PL2 running</pre> <p>This is a default command option, that is, if no other command option is supplied for cudbSystemStatus, the command runs with -v -B -s -C -R -a -m -p options.</p> <p>If the node is disabled, the output will be Disabled instead of the BC server status.</p>

5.4 OAM Improvements in CUDB 1.3

Table 44 shows the alarm changes. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 44 Summary of New, Modified, and Removed Alarms

Alarm	Impact
Operating System, Server Configuration Backup Fault	<p>Modified active description of alarm. The <fault reason> parameter is available in the output to provide more information on configuration backup failures.</p> <p>The possible values are the following:</p> <ul style="list-style-type: none">• applyConfig action is ongoing.• There are pending configuration changes.• Backup with the same name already exists.• Internal fault.

Table 45 describes the changes in configuration objects and attributes. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information on CLI commands and command options.



Table 45 Summary of New, Modified, and Removed Configuration Objects and Attributes

Class	Attribute	Impact
CudbExternalAuthServer	tlsMode ⁽¹⁾	<p>New attribute that indicates if a secure session will start:</p> <ul style="list-style-type: none"> From an insecure session: STARTTLS (port 389) Directly: LDAP over SSL (LDAPS) (port 636)
CudbLocalNode	networkElementName	<p>Modified attribute.</p> <p>Added restriction to attribute name to allow only characters A to Z, a to z, 0 to 9 and characters “-” and “_”.</p>

(1) Already included in 16A FD1 CP1.

5.5 Improvements in CUDB 1.4

5.5.1 Application Counters

Cron task configuration procedure for application counters is changed to provide a persistent configuration for multiple .cron files after SC reboot.

Refer to the Configure Cron Task section of [CUDB Application Counters](#), Reference [12] for more information regarding the changes.

5.5.2 OAM Improvements

Table 46 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters](#), Reference [7] for more information.

Table 46 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbDataBackup		Created backups are accessible to users in cudbadmin group. ⁽¹⁾
cudbManageStore	backup	Created backups are accessible to users in cudbadmin group.
cudbSystemDataBackupAndRestore	-c --create	Created backups are accessible to users in cudbadmin group.
/opt/ericsson/cudb/OAM/bin/slapcat		To access export files, users in cudbadmin group must execute slapcat command without sudo .

(1) Already included in 16A FD1 CP1.



5.5.2.1 Logging

5.5.2.1.1 LDAP FE Monitor

New and modified logging events are included due to impacts in the following components:

— LDAP FE Monitor

Refer to [CUDB Node Logging Events, Reference \[6\]](#) for more information on logging.

5.5.2.1.2 commandlog

The number of logs in `commandlog`, generated by user login to CUDB, has been reduced and it contains only one log.

5.6 Improvements in CUDB 1.5

5.6.1 OAM Improvements

Users that belong to the `cudbadmin` group can access NETCONF SSH subsystem.

Table 47 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 47 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
<code>cudbBCServersRestart</code>	<code>-f</code> <code>--fast</code> ⁽¹⁾	New command option restricted to Ericsson personnel.
<code>cudbFollowLdapfeLogs</code>	<code>-v</code> <code>--invert-match</code>	New command option restricted to Ericsson personnel.
<code>cudbManageBCServer</code>	<code>-restart</code> <code>-no_check</code> ⁽¹⁾	New command option restricted to Ericsson personnel.
<code>cudbManageNode</code>	<ul style="list-style-type: none"><code>-d</code> <code>--disable</code><code>-e</code> <code>--enable</code><code>-b</code> <code>--block</code><code>-u</code> <code>--unblock</code><code>-n</code> <code>--nodes</code><code>--no-prompt</code><code>--allow-node-skip</code><code>--apply-on-node</code><code>-h</code> <code>--help</code>	New command restricted to Ericsson personnel.



Table 47 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSystemStatus	-C --new-cluster-status	In case of erroneous behavior of a system, when no status is reported in BC Cluster for DS replicas on a node, cudbSystemStatus reports the retrieved information as an error with appropriate description. Example: Checking Clusters status: <ul style="list-style-type: none"> [-E-] No information about DSG status from BC Cluster.
	-I	Deprecated command option.
	-R --new-replication-status	cudbSystemStatus handles disabled node(s), disabled DS(s), or both in the system by marking them as Xu (unreachable) in Replication Channels Table. Furthermore, in case of a disabled node, the Detailed Replication Status for the Slave Replicas will show that a specific node is Disabled and the replication for its DS(s) is Stopped as Data Store is disabled. Similarly, in case of disabled DS(s), Detailed Replication Status will show that the replication is Stopped as Data Store is disabled.

(1) Already included in 16A FD1 CP1.

5.6.2 SOAP Notifications

Two new alarms have been introduced to indicate unwanted events that may occur during the notification process. These events were only logged, previously.

Table 48 shows the alarm changes. Refer to [CUDB Node Fault Management Configuration Guide](#), Reference [5] and the related alarm OPIs for detailed information about the alarms.

Table 48 Summary of New Alarms

Alarm	Impact
SOAP Notifications, Endpoint Unreachable	New alarm
SOAP Notifications, Discarded Notifications	New alarm

5.6.3 Encrypted rootdn Password

This is an improvement to the CUDB security functions. This improvement allows the rootdn password to be stored encrypted when the root user is defined.



5.6.3.1 Interface Improvements

Table 49 describes the interface changes between the existing and new revisions of the product.

Table 49 Summary of Interface Changes

Protocol	Nodes	Impact
LDAP LDAP v3	CUDB	The use of a custom SASL mechanism (CUDB-CRYPTO) is allowed, to avoid storing LDAP root user password in cleartext in configuration files. When custom SASL mechanism (CUDB-CRYPTO) is used within LDAP commands (search, modify, add, delete) the user is forced to introduce LDAP root user password in a prompt not echoed to the console.

5.6.3.2 Data Model

Table 50 describes the changes in configuration objects and attribute. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for more information.

Table 50 Summary of New, Modified, and Removed CUDB Configuration Objects and Attributes

Class	Attribute	Impact
CudbLdapAccess	ldapRootPassword	Attribute type changed from <code>EcimPasswordString</code> to <code>EcimpassPhraseString</code> . When configured through CLI, value has to be introduced twice and is not echoed.

5.7 Improvements in CUDB 1.6

5.7.1 OAM Improvements

Table 51 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 51 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbLdapFeRestart	-f --force	New -f command option that provides the same behavior as the command (without modifiers) in the previous versions. Continue with restart, even if any slapd process fails to start.



Table 52 shows the alarm changes. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 52 Summary of New, Modified, and Removed Alarms

Alarm	Impact
Licensing, Emergency Unlock Reset Key Required	Removed translation and definition of this alarm in CUDB.

5.7.2 Multicast Removal

This enhancement to the CUDB Data Availability Coordination system replaces multicast by a TCP based messaging infrastructure.

The main benefit is that it allows the deployment of CUDB in scenarios where multicast support is limited or restricted (for example, cloud environments).

5.7.2.1 Changes in Operation

5.7.2.1.1 Alarms

Table 53 shows the alarms impacted by new or modified functions. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 53 Summary of New and Modified Alarms

Alarm	Impact
Control, Messaging Service Server Down	New alarm
Control, Messaging Service Cluster Down	New alarm

5.7.2.1.2 Commands and Command Options

Table 54 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 54 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Impact
cudbManageMsgSrvServer	New command used to manage the Messaging Service servers in the CUDB node. Refer to CUDB High Availability, Reference [13] for more information.



5.8 Improvements in CUDB 1.7

5.8.1 OAM Improvements

Table 55 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 55 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSwBackup	-U --Unschedule	Remove a periodic software and configuration backup according to the defined <cron expression>. The format of the <cron expression> follows the standard UNIX cron expression format.
cudbPmJobReload		Deprecated command. If ESA PM Agent needs to be restarted, execute /sbin/service esapma restart in both SCs. See Section 5.8.4 on page 51 for more information.

Table 56 shows the alarm changes. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 56 Summary of New and Modified Alarms

Alarm	Impact
SAF, AMF Component Cleanup Failed	Modified alarm. Resource ID does not contain the complete DN, but a relative path from 'ManagedElement=1' instead.
SAF, AMF Component Instantiation Failed	Modified alarm. Resource ID does not contain the complete DN, but a relative path from 'ManagedElement=1' instead.
SAF, AMF SI Unassigned	Modified alarm. Resource ID does not contain the complete DN, but a relative path from 'ManagedElement=1' instead.

5.8.2 Centralized Security Event Logging

The Centralized Security Event Logging function allows a CUDB node to send log information to an external logging server. The format of the logs sent to the Remote Server has been modified as explained in the Sending Logs to a Remote Server section of [CUDB Node Logging Events, Reference \[6\]](#).

5.8.3 Import and Export Procedures

To export LDIF file, -l parameter must be used. The output redirection ">" is deprecated.



```
/opt/ericsson/cudb/OAM/bin/slapcat -l <output-file>
```

5.8.4 Application Counters

Due to the deprecation of cudbPmJobReload command, the following procedures have been updated to handle the application counters correctly:

- Configure Jobs to Generate Output Files in CUDB Application Counters, Reference [12].
- Configuring Counter Output Files Names in CUDB Performance Guide, Reference [14].
- Creating a New DSG, available to Ericsson personnel only, in CUDB System Administrator Guide, Reference [15].

5.9 Improvements in CUDB 1.8

5.9.1 OAM Improvements

Table 57 describes the new and modified alarms in CUDB. Refer to [CUDB Node Fault Management Configuration Guide](#), Reference [5] and the related alarm OPIs for detailed information about the alarms.

Table 57 Summary of New and Modified Alarms

Alarm	Impact
Storage Engine, Unable to Synchronize Cluster in DS, Major	Modified alarm. Alarm Active Description attribute also contains human readable date format along with the timestamp.
Storage Engine, Unable to Synchronize Cluster in DS, Warning	Modified alarm. Alarm Active Description attribute also contains human readable date format along with the timestamp.
Storage Engine, Unable to Synchronize Cluster in PLDB, Major	Modified alarm. Alarm Active Description attribute also contains human readable date format along with the timestamp.
Storage Engine, Unable to Synchronize Cluster in PLDB, Warning	Modified alarm. Alarm Active Description attribute also contains human readable date format along with the timestamp.

5.9.2 Centralized Security Event Logging

The Centralized Security Event Logging function allows a CUDB node to send log information to an external logging server. The format of the logs sent to the Remote Server has been modified as follows:

- Logs sent to the remote server include an identity of the sender process.
- Timestamp of collected logs follow [RFC 3339](#), Reference [18].



For further details on logs sent to remote server, refer to the Sending Logs to a Remote Server section of [CUDB Node Logging Events, Reference \[6\]](#).

5.10 Improvements in CUDB 1.10

5.10.1 OAM Improvements

5.10.1.1 Logging

LDAP FE log files are allowed to grow up to 10 MB and are rotated three times before being removed. Refer to the LDAP FE section of [CUDB Node Logging Events, Reference \[6\]](#) for more information.

5.10.2 Electronic Software License Improvement

The Electronic Software License function requires to perform licensing-related activities during installation or upgrade, such as getting digital fingerprints on every node in the system and requesting License Key Files from Ericsson Sourcing and Supply.

This function has been improved with a new tool for the generation of the digital fingerprints.

5.10.2.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

5.10.2.1.1 Commands and Command Options

Table 58 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 58 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Impact
cudbLicensingTool	Removed command.

5.10.2.1.2 Data Model

Table 59 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description, Reference \[2\]](#) for detailed information about the configuration objects and their attributes.



Table 59 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbSystem	customerId	New attribute that uniquely identifies the customer identity.
CudbSystem	deploymentId	New attribute that uniquely identifies the deployed customer system.
CudbSystem	productNumber	New attribute with the CXP product number for the CUDB software.

5.11 OAM Improvements in CUDB 1.11

Table 60 describes the new and modified alarms in CUDB. Refer to [CUDB Node Fault Management Configuration Guide, Reference \[5\]](#) and the related alarm OPIs for detailed information about the alarms.

Table 60 Summary of New and Modified Alarms

Alarm	Impact
Storage Engine, Data Inconsistency between Replicas Found in DS, Major	Modified alarm. Resource Id and Alarm Active Description attributes are updated.
Storage Engine, Data Inconsistency between Replicas Found in DS, Minor	Modified alarm. Resource Id and Alarm Active Description attributes are updated.
Storage Engine, Data Inconsistency between Replicas Found in PLDB, Major	Modified alarm. Resource Id and Alarm Active Description attributes are updated.
Storage Engine, Data Inconsistency between Replicas Found in PLDB, Minor	Modified alarm. Resource Id and Alarm Active Description attributes are updated.
Operating System, Server Configuration Backup Fault	Modified alarm. Resource Id attribute is updated.

Table 61 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 61 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSwBackup	-c	Modified command output.
cudbAppCheckerManager		New command restricted to Ericsson personnel.

5.12 Improvements in CUDB 1.12

5.12.1 LDAP Node Counters

This section describes changes in per-application group LDAP node counters in CUDB. AppGroupn range has been expanded with 10 additional groups to increase granularity when counting operations on a per-application basis. Refer



to the Per-Application Group LDAP Node Counters section of [CUDB Counters List](#), Reference [8] for more information.

5.12.1.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

5.12.1.1.1 Data Model

Table 62 describes the changes in configuration objects and attributes. Refer to [CUDB Node Configuration Data Model Description](#), Reference [2] for detailed information about the configuration objects and their attributes.

Table 62 Summary of New and Modified Configuration Objects and Attributes

Class	Attribute	Impact
CudbLdapUser	countersGroup	Modified attribute. Data Type changed.

5.12.2 OAM Improvements in CUDB 1.12

Table 63 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters](#), Reference [7] for more information.

Table 63 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbCheckConsistency	-o	Modified command parameter behavior.

5.13 Improvements in CUDB 1.13

5.13.1 OAM Improvements in CUDB 1.13

Table 64 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters](#), Reference [7] for more information.

Table 64 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbApplyConfig	-s	Removed <code>init</code> value. It is not a supported value of <code>-s</code> command option anymore.
cudbSdpInstall		Removed command.
cudbSdpReplace		Removed command.



Table 64 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbSdpUninstall		Removed command.
cudbInstall		Removed command.

5.13.2 Security Improvements

The following change improves security functions:

- Hardening is automatically enforced by CUDB.

5.13.3 Restoration of Multiple Backups into a Single Destination Cluster in Hardware Migration through Backup and Restore Procedures

This is an improvement to the Hardware Migration through Backup and Restore procedure both from GEP3 to GEP5 and from native CUDB to virtualized CUDB. It allows the user to provide mapping for restoring several DSGs from a source system to a target system.

6 Functions Planned for Coming Releases

This section provides changes in the product that are parts of the functions planned for coming releases.

These functions are not generally available, yet. They are either in a ready-for-tendering status only, or they are delivered in phases, following the continuous delivery to a software track strategy.

The use of partially delivered functions will not take effect in the system until the function is completed and is generally available. Legacy behavior is not changed.

6.1 Impacts in VNF Workflows

6.1.1 VNF Scale-Out Workflow

This new workflow will allow automatic scale-out in vCUDB with Open Shortest Path First (OSPF) routing. The scale-out workflow will be part of the VNF package to be executed according to [CUDB VNF Lifecycle Management, Reference \[4\]](#) in the OSS-RC/ENM. VNF must configure the new resources automatically.



6.1.1.1 Changes in Operation

This section describes changes to commands and command options, configuration parameters, alarms, counters, logging, and tools.

6.1.1.1.1 Commands and Command Options

Table 65 describes the new, modified, and removed CLI commands and command options. Refer to [CUDB Node Commands and Parameters, Reference \[7\]](#) for more information.

Table 65 Summary of New, Modified, and Removed CUDB CLI Commands and Command Options

Command	Command Option	Impact
cudbManageDsGroup	<ul style="list-style-type: none">• -a --add• -r --remove• -i --dsgId• -h --help	New command restricted to Ericsson personnel.

6.1.1.1.2 Counters

The following new counters will be introduced:

- kpiDsMemoryUsageUnbalance
- kpiLdapFesLoadUnbalance

Refer to [CUDB Counters List, Reference \[8\]](#) for more information.

6.2 Geographical Redundancy Decrease and Site Decommissioning

CUDB will support geographical redundancy decrease and site decommissioning by allowing decommission of the last node in the site for CUDB systems with more than two sites.



Glossary

AMC

Automatic Mastership Change

BC

Blackboard Coordination

BSP

Blade Server Platform

CEE

Cloud Execution Environment

CLI

Command Line Interface

CS

Cluster Supervisor

CUDB

Ericsson Centralized User Database

DE

Distribution Entry

DIT

Directory Information Tree

DN

Distinguished Name

DS

Data Store

DSG

DS Unit Group

FE

Front End

GEP3

Generic Ericsson Processor version 3

GEP5

Generic Ericsson Processor version 5

GEP7L

Generic Ericsson Processor version 7, Low Power

HLR

Home Location Register

HSS

Home Subscriber Server

IoT

Internet of Things

IMM

Information Model Management

IMS

IP Multimedia Subsystem

KPI

Key Performance Indicator

LDAP

Lightweight Directory Access Protocol

LDAP FE

LDAP Front End

LDAPS

LDAP over SSL

LOTG

Linux Open Telecom Cluster

NIR

Network Impact Report

NMS

Network Management System

OAM

Operation and Maintenance

OPI

Operating Instruction



OSPF

Open Shortest Path First

PL

Processing Layer

PLDB

Processing Layer Database

PM

Performance Management

POSIX

Portable Operating System Interface

QoS

Quality of Service

SC

System Controller

SOAP

Simple Object Access Protocol

UDC

User Data Consolidation

UPG

User Profile Gateway

vCUDB

Virtualized CUDB

VM

Virtual Machine

VNF

Virtualized Network Function



Reference List

CUDB Documents

- [1] CUDB Technical Product Description, 221 02-FGC 101 3147
- [2] CUDB Node Configuration Data Model Description, 1/192 02-CSH 109 067/10
- [3] CUDB Application Schema Update, 2/1553-CSH 109 067/10
- [4] CUDB VNF Lifecycle Management, 1/1553-CNL 121 695/10
- [5] CUDB Node Fault Management Configuration Guide, 3/1553-CSH 109 067/10
- [6] CUDB Node Logging Events, 4/1553-CSH 109 067/10
- [7] CUDB Node Commands and Parameters, 1/1553-CSH 109 067/10
- [8] CUDB Counters List, 1/006 51-CSH 109 067/10
- [9] CUDB Node Network Description, 4/1551-CSH 109 067/10
- [10] CUDB LDAP Interwork Description, 1/155 19-HDA 104 03/10
- [11] CUDB Security and Privacy Management, 8/1553-HDA 104 03/10
- [12] CUDB Application Counters, 10/155 34-HDA 104 03/10
- [13] CUDB High Availability, 7/155 34-HDA 104 03/10
- [14] CUDB Performance Guide, 4/1553-HDA 104 03/10
- [15] CUDB System Administrator Guide, 2/1543-HDA 104 03/10
- [16] CUDB Glossary of Terms and Acronyms, 0033-HDA 104 03/10

Other Documents and Online References

- [17] Reliable Delivery for syslog <https://www.ietf.org/rfc/rfc3195.txt>
- [18] Date and Time on the Internet: Timestamps. IETF RFC 3339 <https://www.ietf.org/rfc/rfc3339.txt>