Technical User Guide

SSB Retuning Automations v0.7.6

Service Overview

SSB Retuning Automations parses network logs, performs ConfigurationAudit checks, optionally compares PRE/POST states with ConsistencyChecks, and generates Excel deliverables and correction command exports.

This document provides the official user-facing documentation for the SSB Retuning Automations tool. It explains how to prepare inputs, how each module behaves, which execution modes are available, and how to interpret all generated outputs.

Service Overview

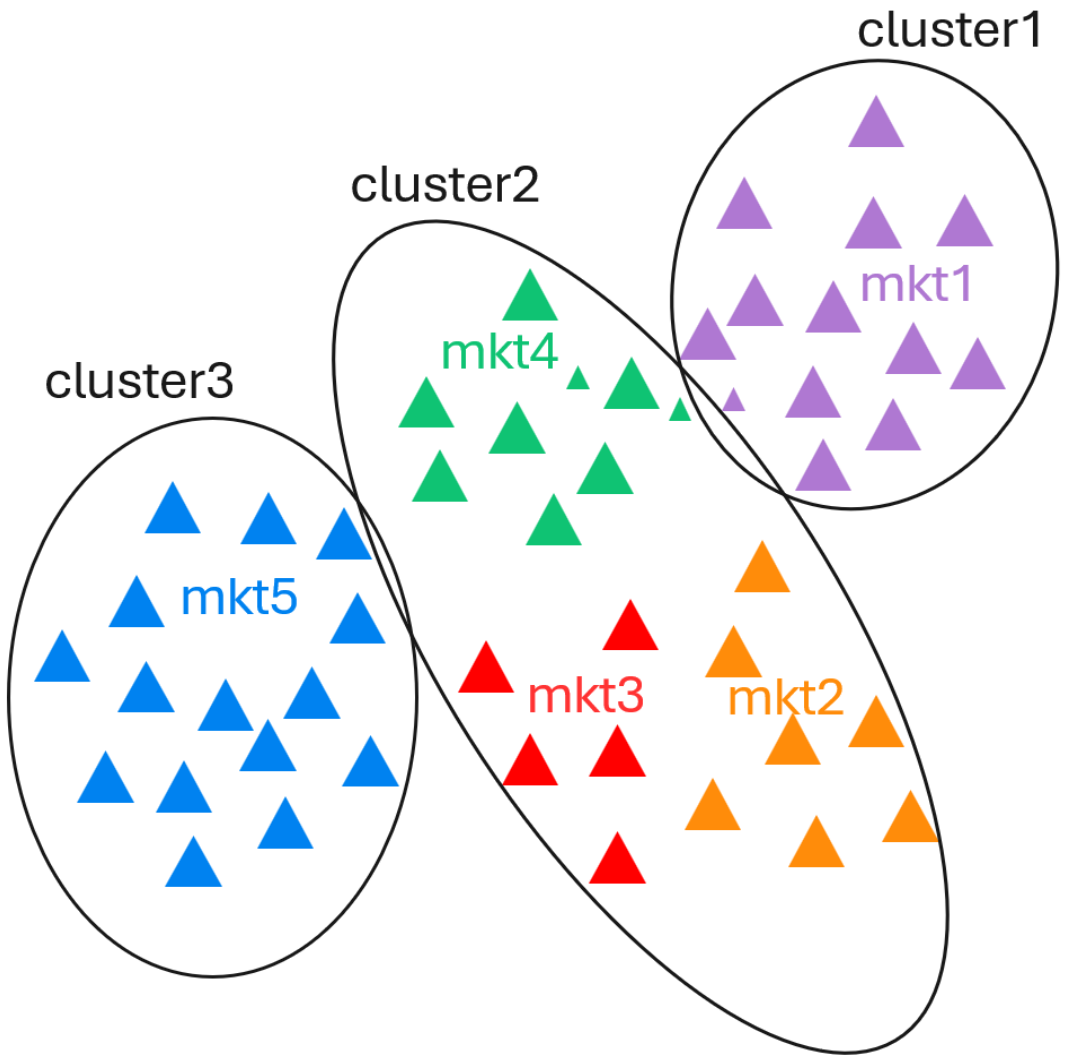
Coexistence of old & new SSB:

Coexistence of old/new SSB will split UE measurements in 2 frequencies. A cell ranked 3rd might become 1st after the split, increasing the risk of connecting to overshooting cells.

- To handle this, suggest setting lower priority for the SSB not collocated to minimize potential issues due to overshooting
- Retune cluster sites with low priority to old SSB (priority change on Step2)
- Neighboring sites with low priority to new SSB
- UEs camping on neighboring sites to retune cluster will not try to reselect or add ENDC on new SSB (lower priority)
- UEs camping on border sites in retune cluster will not try to reselect or add ENDC on old SSB (lower priority)
- Step1 will add FreqRelation to new SSB in retune + neighboring clusters
- Step2 will not remove FreqRelation to old SSB
- ENDC and Mobility allowed in border and neighboring sites with existing CellRelations

Service Overview

Clusters definition and pre-checks



- Relations with old and new SSB will coexist in some nodes for a certain period, in some cases making intra-frequency relations become inter-frequency relations with impact on NR and ENDC mobility. Inter-frequency mobility will not be started until serving cell will go below a certain level entering the search zone, that might not be reached in locations that used to trigger intra-frequency mobility towards a best server. In addition, once the UE starts to measure either in idle or connected mode, the old and new SSBs will be reported in 2 separate frequencies and a cell ranked 3rd might become 1st after the split, creating the risk of connecting to cells suffering high interference.
- The amount and duration of such situations will depend on the retune clusterization and planning that should be aimed at minimizing the old and new SSB borders.
- Mobility optimizations might be recommended to mitigate the impact on KPIs such as drop rate.
- Full audit needed to evaluate the number of MOs and anticipate any additions that might be needed to the scripts for different markets.
- Detect if any MOs exceeding the allowed cardinality adding the new SSB definitions:
  - Max NRFrequency definitions per node (limit 64)
  - Max NRFreqRelation per NR cell (limit 16)
  - Max GUtranSyncSignalFrequency definitions per node (limit 24)
  - Max GUtranFreqRelation per LTE cell (limit 16)
- Identify retune+border clusters with markets being planned on different nights

Service Overview

Process: Initial network audit + Two Steps approach + Final Clean-Up

Step0, initial network audit

- Pre-checks export with all relevant MOs and params in retune+border clusters, including cellRelation. Evaluate the number of MOs and anticipate any additions that might be needed to the scripts for different markets

Step1, before SSB retune including neighboring sites

- Retune readiness in retune + neighboring clusters
- Following the clusterization and planning phase, there would be a first step preparing the network for the coexistence of old and new SSBs.
- New GUtranSyncSignalFrequency/GUtranFreqRelation and NRFrequency/NRFreqRelation instances following VZ naming convention added manually before SSB retune. Nodes of all NR and LTE bands with FreqRelations to the retuned frequency are considered
- NrFreqRel profiles containing new SSB names
- Low PRIO for new SSB: endcB1MeasPriority 2->1, to mitigate the impact in retune borders
- Add new SSB to FreqPrioNR

Step2, SSB retune cluster

- Finally, in the second step we will proceed with the SSB retune in the retune clusters.
- SSB retune NR N77 cells in a cluster
- NrCell, NrFreqRel and EUtranFreqRel profiles containing new SSB names
- Replace old SSB on EndcDistrProfile gUtranFreqRef and MandatoryGUtranFreqRef
- Normal PRIO for new SSB: endcB1MeasPriority 2
- Low PRIO for old SSB: endcB1MeasPriority 2->1, to mitigate the impact in retune borders
- Step2 Cleanup, Relations and ExternalCell that failed to update automatically
  - Lock/unlock Termpoints

Service Overview

Process: Initial network audit + Two Steps approach + Final Clean-Up (cont.)

- Set ExternalCell Frequency
- Delete and re-create CellRelations
- Remove CellRelations that ANR might have added due to outage during SSB retune

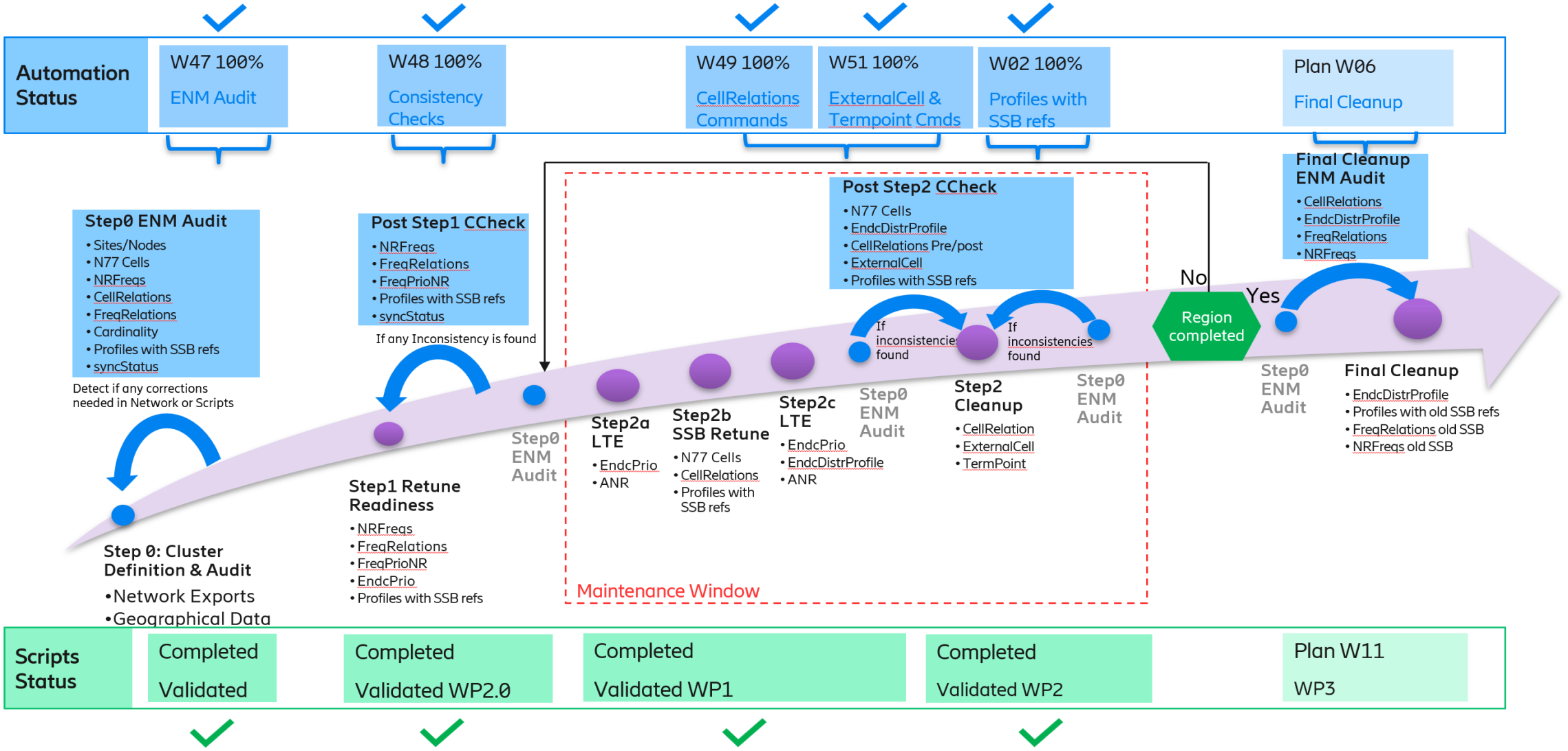
Final Cleanup (after all clusters done in a region and no borders with old SSB)

- There should not be any CellRelation pointing to old SSB Freq
- Remove old SSB GUtranSyncSignalFrequency/GUtranFreqRelation and NRFrequency/NRFreqRelation
- Remove NrCell, NrFreqRel and EUtranFreqRel profiles containing old SSB names

Service Overview

Retune process roadmap

Retune Process Roadmap



SSB Retuning Automations - Overview

Structure and Inputs/Outputs

Structure

- SSB Retuning Automations is an automation platform for SSB retuning projects that can run in GUI or CLI mode or through a Web Interface (using a server/client infrastructure) and orchestrates five functional modules:
  - Module 0: Update Network Frequencies.
  - Module 1: Configuration Audit & Logs Parser.
  - Module 2: Consistency Check (manual Pre/Post).
  - Module 3: Consistency Check Bulk (automatic Pre/Post detection by market).
  - Module 4: Final Clean-Up.
- The main execution lives in "src/SSB_RetuningAutomations.py", where CLI arguments, GUI, configuration persistence, input resolution (folders/ZIP), per-module execution, and artifact versioning are managed.

Inputs

Inputs are folders (or ZIP archives) containing log files. The tool parses the logs into MO tables and runs checks on them. For ConsistencyChecks, provide either explicit PRE and POST folders or a single root folder where PRE/POST runs can be auto-detected.

Outputs

Each module generates a dedicated output folder containing Excel reports, logs, and optional correction command exports.

SSB Retuning Automations - Overview

Repository architecture, Execution modes and Versioning

Orchestration core

- "src/SSB_RetuningAutomations.py": entry point, CLI/GUI parsing, module routing, batch/bulk execution, and versioning.

Main modules files

- "src/modules/ConfigurationAudit/ConfigurationAudit.py": log parsing and audit workbook construction (Excel + PPT).
- "src/modules/ConfigurationAudit/ca_summary_excel.py": assembly of "SummaryAudit" and discrepancy dataframes.
- "src/modules/ConsistencyChecks/ConsistencyChecks.py": PRE/POST loading, relation comparison, discrepancies, and output export.
- "src/modules/ProfilesAudit/ProfilesAudit.py": profiles audit (integrated into module 1).
- "src/modules/CleanUp/FinalCleanUp.py": final clean-up (base implementation for extension).

Common layer and utilities

- "src/modules/Common/*.py": correction command logic and shared functions.
- "src/utils/*.py": IO, parsing, frequency handling, Excel, pivots, sorting, infrastructure, and timing.

Execution modes

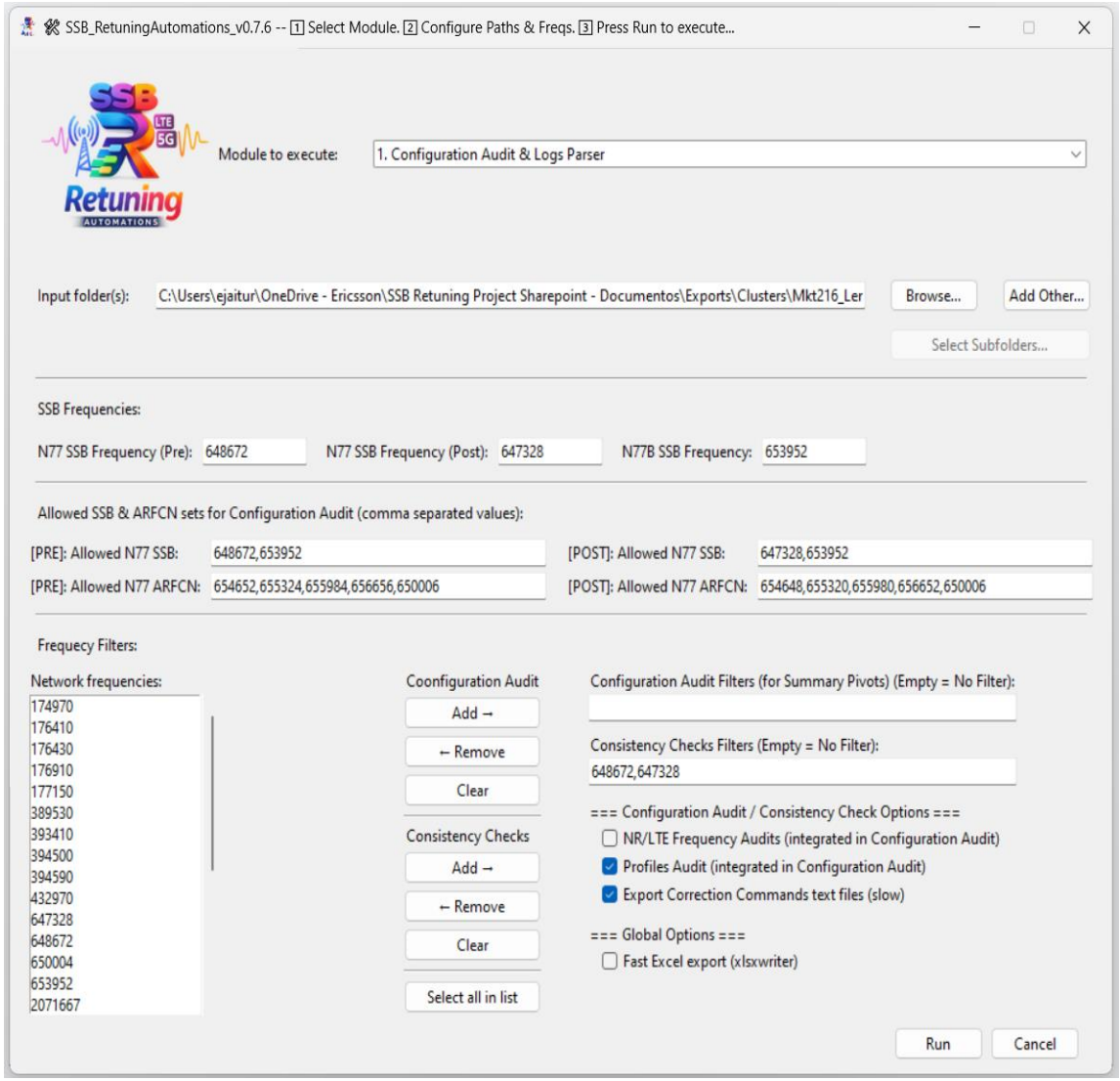
- The tool can be run in three different modes:
  - GUI mode: run without CLI arguments.
  - CLI mode: run with explicit module and options.
  - Web Interfacee: the tool can be run in a server/client infrastructure, accessing the server through a Web Interface where you can unpload your inputs, enqueue different tasks and export the results when finish..

Versioning

- All Generated artifacts include a versioned suffix: "<timestamp>_v<TOOL_VERSION>". This guarantees traceability and avoids collisions between runs.

SSB Retuning Automations - Interfaces

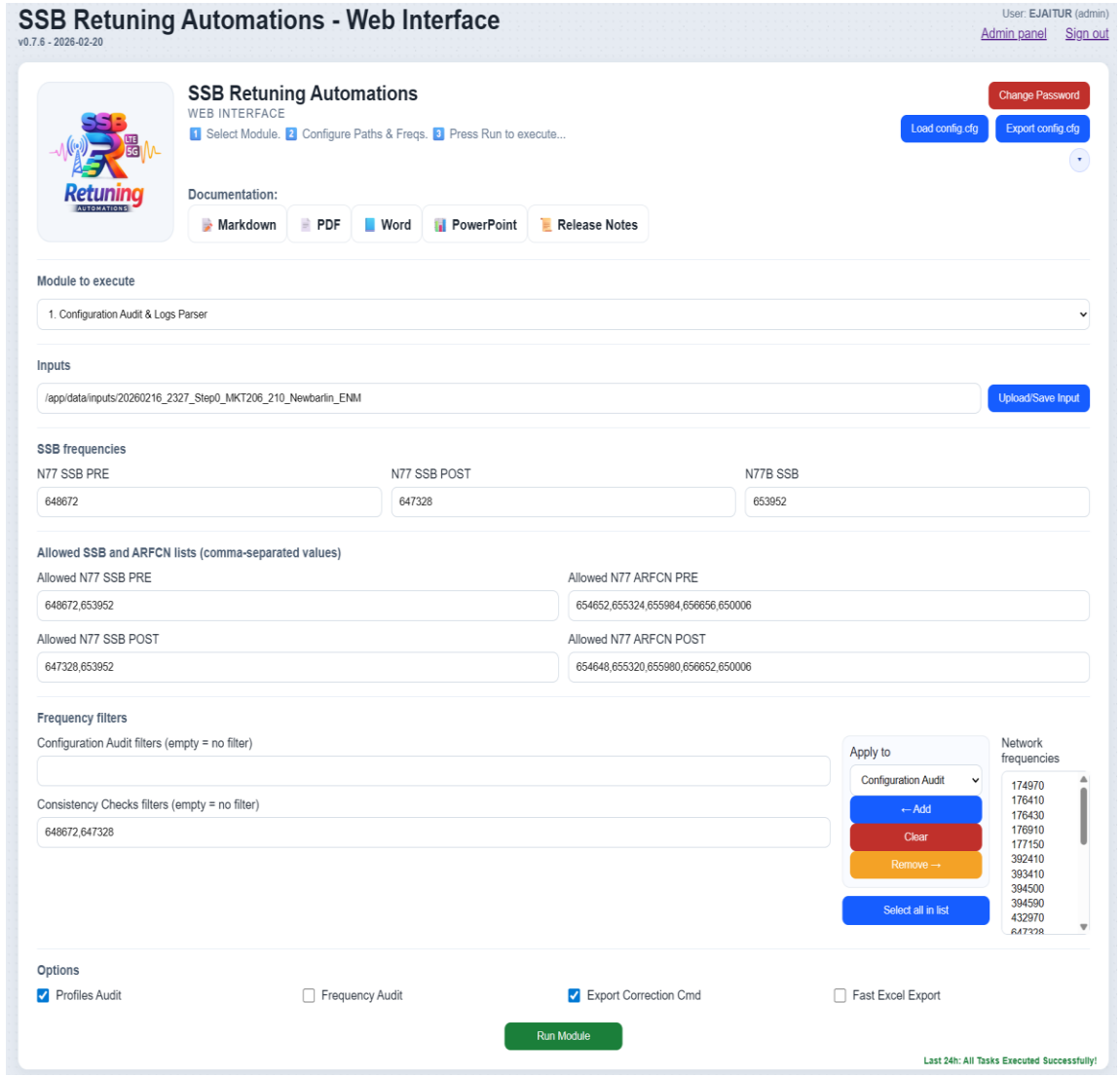
Graphical User Interface - GUI Panel



- This is the main Graphical User Interface for SSB Retuning Automations.. From this panel you can select the modules you want to run and the inputs you want to provide.
- You can also configure some settings like the network frequencies to use or the Input folder to use.
- The tool will then run the selected modules and generate the outputs.

SSB Retuning Automations - Interfaces

Web Interface - User Section



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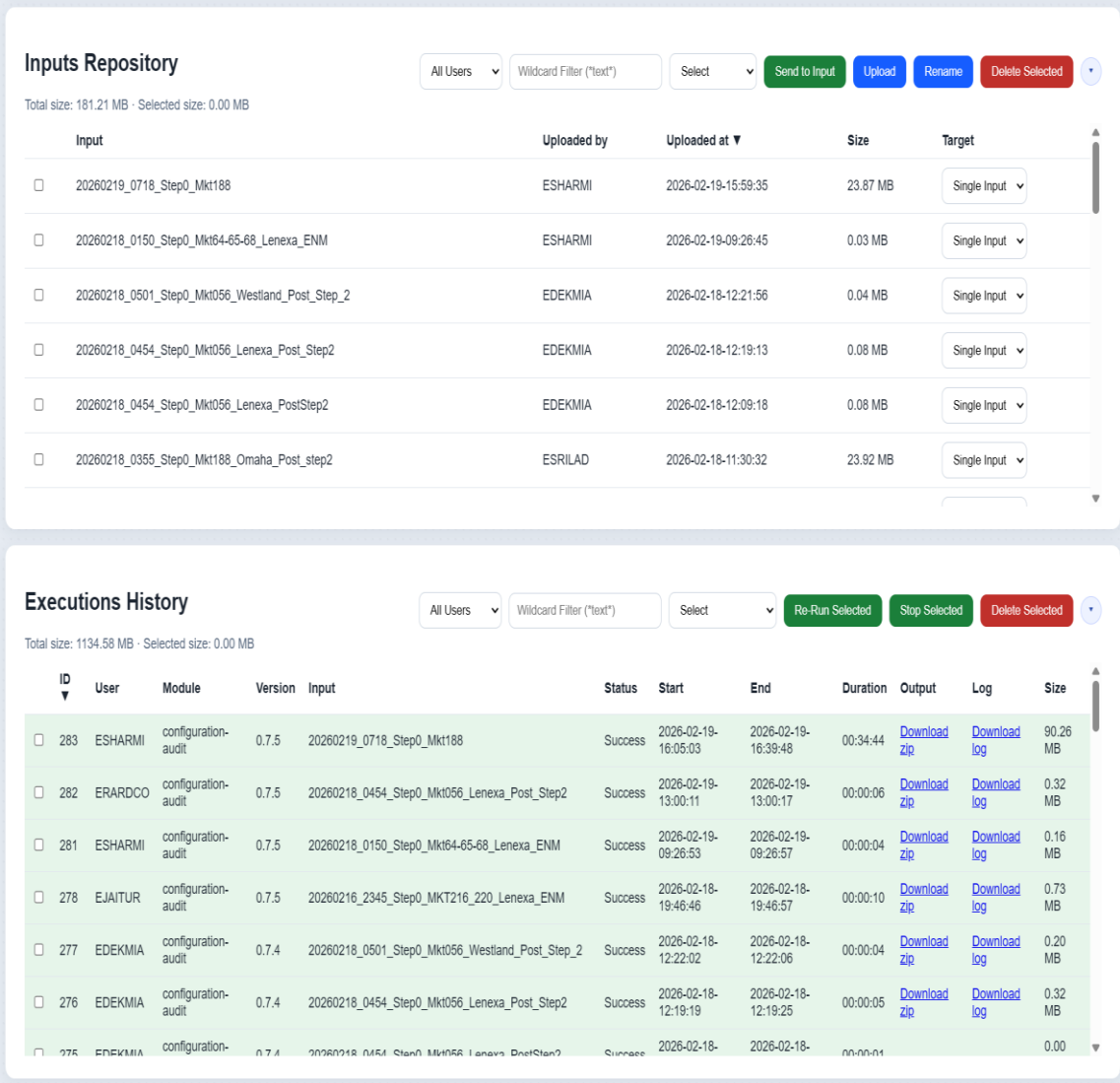
SSB Retuning Automations - Interfaces

Web Interface - Inputs Repository Panel



Inputs Repository

All Users | Wildcard Filter (*text*) | Select | Send to Input | Upload | Rename | Delete Selected

Total size: 181.21 MB · Selected size: 0.00 MB

Input	Uploaded by	Uploaded at ▼	Size	Target
20260219_0718_Step0_Mkt188	ESHARMI	2026-02-19-15:59:35	23.87 MB	Single Input
20260218_0150_Step0_Mkt64-65-68_Lenexa_ENM	ESHARMI	2026-02-19-09:26:45	0.03 MB	Single Input
20260218_0501_Step0_Mkt056_Westland_Post_Step_2	EDEKMIA	2026-02-18-12:21:56	0.04 MB	Single Input
20260218_0454_Step0_Mkt056_Lenexa_Post_Step2	EDEKMIA	2026-02-18-12:19:13	0.08 MB	Single Input
20260218_0454_Step0_Mkt056_Lenexa_PostStep2	EDEKMIA	2026-02-18-12:09:18	0.08 MB	Single Input
20260218_0355_Step0_Mkt188_Omaha_Post_step2	ESRILAD	2026-02-18-11:30:32	23.92 MB	Single Input

Executions History

All Users | Wildcard Filter (*text*) | Select | Re-Run Selected | Stop Selected | Delete Selected

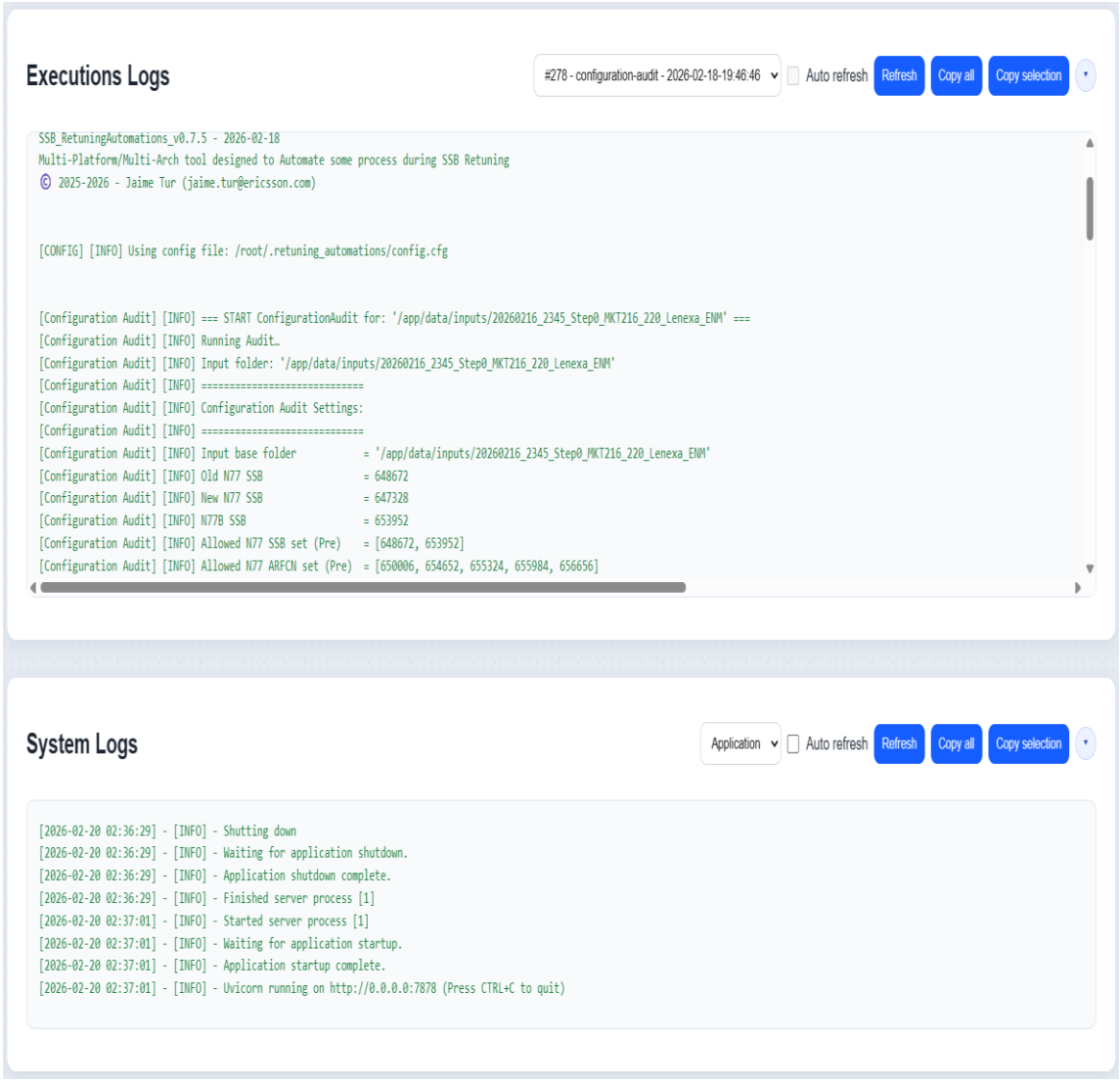
Total size: 1134.58 MB · Selected size: 0.00 MB

ID ▼	User	Module	Version	Input	Status	Start	End	Duration	Output	Log	Size
283	ESHARMI	configuration-audit	0.7.5	20260219_0718_Step0_Mkt188	Success	2026-02-19-16:05:03	2026-02-19-16:39:48	00:34:44	Download zip	Download log	90.26 MB
282	ERARDCO	configuration-audit	0.7.5	20260218_0454_Step0_Mkt056_Lenexa_Post_Step2	Success	2026-02-19-13:00:11	2026-02-19-13:00:17	00:00:06	Download zip	Download log	0.32 MB
281	ESHARMI	configuration-audit	0.7.5	20260218_0150_Step0_Mkt64-65-68_Lenexa_ENM	Success	2026-02-19-09:26:53	2026-02-19-09:26:57	00:00:04	Download zip	Download log	0.16 MB
278	EJAITUR	configuration-audit	0.7.5	20260216_2345_Step0_MKT216_220_Lenexa_ENM	Success	2026-02-18-19:46:46	2026-02-18-19:46:57	00:00:10	Download zip	Download log	0.73 MB
277	EDEKMIA	configuration-audit	0.7.4	20260218_0501_Step0_Mkt056_Westland_Post_Step_2	Success	2026-02-18-12:22:02	2026-02-18-12:22:06	00:00:04	Download zip	Download log	0.20 MB
276	EDEKMIA	configuration-audit	0.7.4	20260218_0454_Step0_Mkt056_Lenexa_Post_Step2	Success	2026-02-18-12:19:19	2026-02-18-12:19:25	00:00:05	Download zip	Download log	0.32 MB
275	EDEKMIA	configuration-	0.7.4	20260218_0454_Step0_Mkt056_Lenexa_PostStep2	Success	2026-02-18-	2026-02-18-	00:00:01			0.00

- You can see some information about the Inputs Repository.

SSB Retuning Automations - Interfaces

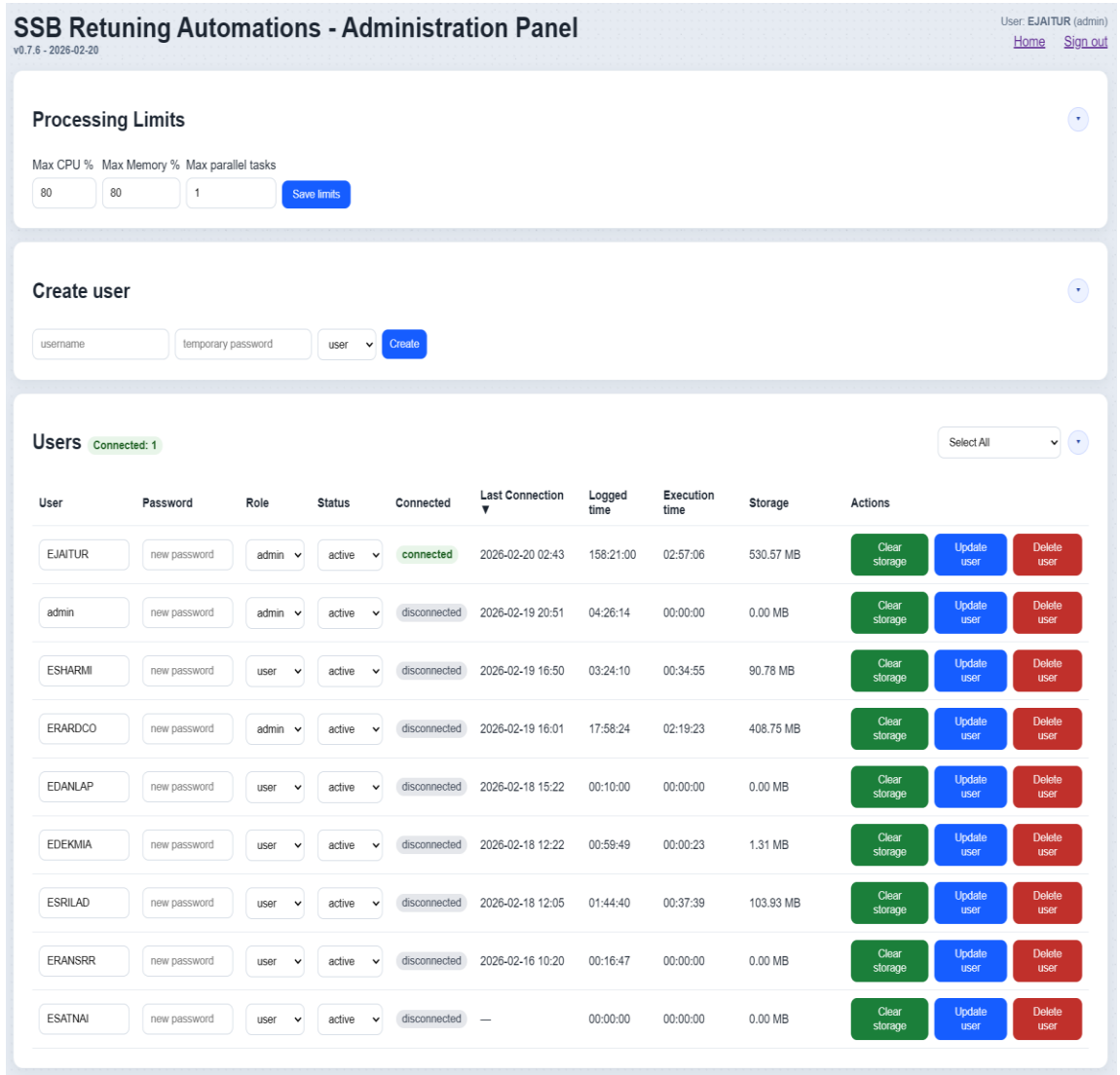
Web Interface - Executions and System Logs Panels



- You can see some information about Last Executions and some useful System Logs of the tool.

SSB Retuning Automations - Interfaces

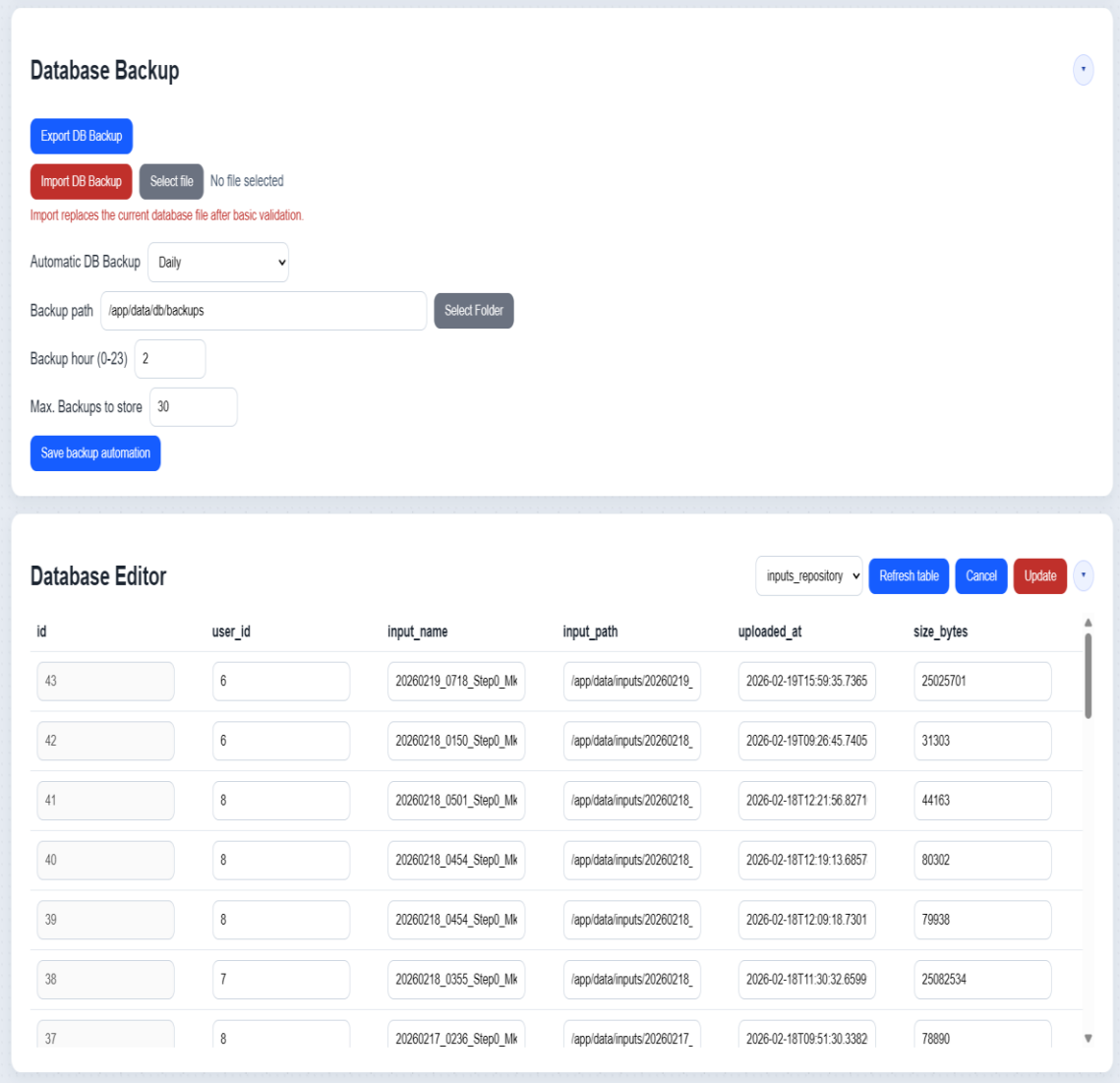
Web Interface - Admin Section



- This is the main Administrator Panel for SSB Retuning Automations. From this panel you can manage the configuration of the tool, view logs and manage user access.

SSB Retuning Automations - Interfaces

Web Interface - Database Management Panels



- With those panels you can manage the database of the tool, schedule backups tasks, or edit the database content directly.

SSB Retuning Automations - Interfaces

Command Line Interface - CLI

With the CLI you can run the modules you want to run and provide all different arguments you need.

▶️ Basic Syntax:

- SSB_RetuningAutomations.exe --module <module-name> [options]
- If "--module" is omitted and no other arguments are provided, the GUI will launch automatically unless "--no-gui" is specified.

⚙️ Main Options:

Argument	Description
--module	Module to run: ["configuration-audit", "consistency-check", "consistency-check-bulk", "final-cleanup"]
--input	Input folder to process (single-input modules)
--inputs	Input folders to process module in batch mode. Example: "--module configuration-audit --inputs dir1 dir2 dir3"
--input-pre	PRE input folder (only for "consistency-check")
--input-post	POST input folder (only for "consistency-check")
--output	Output root folder override (all modules). The tool still creates the same module/version subfolder logic under this root.

SSB Retuning Automations - Interfaces

Command Line Interface - CLI (cont.)

Argument	Description
--n77-ssb-pre"	N77 SSB frequency before refarming (Pre), e.g. "647328"
--n77-ssb-post	N77 SSB frequency after refarming (Post), e.g. "653952"
--n77b-ssb	N77B SSB frequency (ARFCN), e.g. "650334"
--allowed-n77-ssb-pre	Comma-separated allowed N77 SSB (Pre) values for Configuration Audit
--allowed-n77-arfcn-pre	Comma-separated allowed N77 ARFCN (Pre) values for Configuration Audit
--allowed-n77-ssb-post	Comma-separated allowed N77 SSB (Post) values for Configuration Audit
--allowed-n77-arfcn-post	Comma-separated allowed N77 ARFCN (Post) values for Configuration Audit
--ca-freq-filters	Comma-separated list of frequency substrings to filter pivot columns in Configuration Audit module
--cc-freq-filters	Comma-separated list of frequency substrings to filter relations in Consistency Check module
--frequency-audit	Enable/disable Frequency Audit (integrated into Configuration Audit). Default Value: Enabled (use "--no-frequency-audit" to disable it)
--profiles-audit	Enable/disable Profiles Audit (integrated into Configuration Audit). Default Value: Enabled (use "--no-profiles-audit" to disable it)
--export-correction-cmd	Enable/disable exporting correction command to text files (slow). Default Value: Enabled (use "--no-export-correction-cmd" to disable it).
--fast-excel	Enable/disable fast Excel export using xlsxwriter engine (reduced formatting features if compared to openpyxl). Default Value: Disabled (use "--fast-excel" to enable it).

SSB Retuning Automations - Modules Included

Module 0 — Update Network Frequencies

Input

- Input folder (may contain subfolders/ZIPs already supported by the IO layer).
- Mo logs with an "NRFrequency" table and the "arfcnValueNRDl" column.

Process

1. Scan logs and detects "NRFrequency" blocks.
2. Extracts numeric values from "arfcnValueNRDl".
3. Removes duplicates and sorts frequencies.
4. Updates the persisted “Network frequencies” configuration for GUI/CLI.

Output

- Does not generate Excel/PPT.
- Updates the persisted network frequency value used for filtering and selection in later runs.

Detailed implementation notes

- The module reuses the same input resolver used by the other modules ("ensure_logs_available"), so it can consume either plain folders or folders containing ZIPs without changing operator workflow.
- It scans all detected logs, slices each "SubNetwork" block, and processes only blocks where MO name is exactly "NRFrequency".
- Inside each "NRFrequency" block, it reads "arfcnValueNRDl", keeps only strictly numeric values, deduplicates, and sorts numerically.
- The resulting list is persisted to "config.cfg" in "network_frequencies" and also loaded in-memory into the "NETWORK_FREQUENCIES" global list.

SSB Retuning Automations - Modules Included

Module 0 — Update Network Frequencies (cont.)

- In practice, this module should be executed after collecting representative logs from the network and then only when new frequencies are introduced. For stable markets, running it once is usually enough.

Impact on GUI and Web Interface

- Desktop GUI: when launching in GUI mode (no CLI args), the app loads "network_frequencies" from "config.cfg" and uses that list as the selectable values shown to users.
- Web Interface: the backend endpoint loading defaults first tries persisted "network_frequencies"; if empty, it falls back to parsing the hardcoded defaults from "SSB_RetuningAutomations.py".
- This means Module 0 is the canonical mechanism to keep both interfaces aligned with real network frequency inventory.

SSB Retuning Automations - Modules Included

Module 1 — Configuration Audit & Logs Parser

ConfigurationAudit performs a detailed validation of a single configuration snapshot. It parses network logs, builds Managed Object (MO) tables, and evaluates multiple consistency and retuning-related rules.

ConfigurationAudit validates frequency configuration (SSB/ARFCN), relations, externals, TermPoints, profiles, and cardinality constraints. Results are consolidated in the SummaryAudit sheet.

Execution Modes

ConfigurationAudit can be executed in two main modes:

- Normal mode: The user provides a single input folder. The tool runs all checks and generates one audit output.
- Batch mode: The user provides a root folder containing multiple Step0 runs. The tool automatically detects valid runs and executes ConfigurationAudit for each one.

Inputs

- Input folder with MOs logs (".log", ".logs", ".txt") or ZIPs resolvable by utilities.
- Frequency parameters:
  - "n77_ssb_pre"
  - "n77_ssb_post"
  - "n77b_ssb"
  - allowed SSB/ARFCN lists pre/post.
- Flags:
  - "profiles_audit"
  - "frequency_audit"
  - "export_correction_cmd"
  - "fast_excel_export".

Process

1. Parses files and extracts MO tables by "SubNetwork" blocks.

SSB Retuning Automations - Modules Included

Module 1 — Configuration Audit & Logs Parser (cont.)

2. Generates one sheet per detected table.
3. Builds "SummaryAudit" + pivots/auxiliary summaries.
4. Runs profiles audit if enabled.
5. Exports CA correction commands if requested.
6. Generates the summary PPT.

Outputs

- Folder "ConfigurationAudit_<timestamp>_v<version>/".
- Excel file "ConfigurationAudit_<timestamp>_v<version>.xlsx":
  - Sheets for each parsed MO table.
  - Sheet with a "SummaryAudit" sheet wich contains the audit results.
  - NR/LTE parameter discrepancy sheets.
  - Summary/pivot sheets by frequencies and relations.
- PPT file "ConfigurationAudit_<timestamp>_v<version>.pptx".
- Optional folder "Correction_Cmd_CA/" with AMOS commands.

Main semantic content

- SummaryAudit contains rows with:
  - "Category", "SubCategory", "Metric", "Value", "ExtraInfo",
  - and execution context fields (stage, module, etc. depending on the flow).
- "Value" usually represents a count of impacted nodes/cells/relations.
- "ExtraInfo" contains the NodeId list or a compact discrepancy detail.

SSB Retuning Automations - Modules Included

Module 2 — Consistency Check (manual Pre/Post)

ConsistencyChecks compares PRE and POST relation tables (NRCellRelation and GUtranCellRelation). The comparison uses a stable key per relation (e.g., NodeId + CellId + RelationId).

The module detects missing relations, new relations, and discrepancies (parameter differences and frequency differences). Results are summarized in the comparison Excel.

Execution Modes

- Normal (manual PRE/POST): The user explicitly provides PRE and POST input folders.
- Batch (auto-detected PRE/POST):The user provides a root folder. The tool automatically selects PRE and POST runs based on timestamps and naming rules.

Inputs

- "input_pre" and "input_post" folders. Both folders should contains MOs logs (".log", ".logs", ".txt") or ZIPs resolvable by utilities.
- Frequencies "n77_ssb_pre" and "n77_ssb_post".
- Optional reference to PRE and POST "ConfigurationAudit" to enrich target classification.
- Optional list of frequency filters ("cc_freq_filters").

Process

1. Loads relation tables ("GUtranCellRelation", "NRCellRelation").
2. Normalizes columns/keys and selects the most recent snapshots by date.
3. Detect:
    - new relations,
    - missing relations,

SSB Retuning Automations - Modules Included

Module 2 — Consistency Check (manual Pre/Post) (cont.)

- parameter discrepancies,
- frequency discrepancies,
- summary by PRE/POST frequency pair.

4. Classify destination targets as "SSB-Pre", "SSB-Post" or "Unknown".
5. Exports detailed Excel outputs and correction commands.

Outputs

- "CellRelation_<timestamp>_v<version>.xlsx" (end-to-end relations view).
- "ConsistencyChecks_CellRelation_<timestamp>_v<version>.xlsx" with:
  - "Summary"
  - "SummaryAuditComparisson" (if there is PRE/POST SummaryAudit)
  - "Summary_CellRelation"
  - GU blocks: "GU_relations", "GU_param_disc", "GU_freq_disc", "GU_freq_disc_unknown", "GU_missing", "GU_new"
  - NR blocks: "NR_relations", "NR_param_disc", "NR_freq_disc", "NR_freq_disc_unknown", "NR_missing", "NR_new"
  - optional "GU_all", "NR_all".
- "Correction_Cmd_CC/" with commands per type (new/missing/discrepancies).

Missing Relations

A relation is classified as MISSING in POST when its key exists in PRE but does not exist in POST. In code terms: Missing = PRE_keys − POST_keys.

New Relations

A relation is classified as NEW in POST when its key exists in POST but does not exist in PRE. In code terms: New = POST_keys − PRE_keys.

SSB Retuning Automations - Modules Included

Module 2 — Consistency Check (manual Pre/Post) (cont.)

Parameters Discrepancies

A relation is classified as a DISCREPANCY when the key exists in both PRE and POST, but one or more audited parameters differ. The tool compares shared columns, excluding technical columns (Pre/Post, Date), key columns, and the detected frequency column.

Frequency Discrepancies (SSB)

Frequency discrepancies are identified by extracting a normalized base frequency (Freq_Pre / Freq_Post) and applying retuning rules. Typical rule: if a relation has the target frequency in PRE (or already has POST) but POST does not contain the expected POST frequency, it is flagged for frequency discrepancy handling

SSB Retuning Automations - Modules Included

Module 3 — Consistency Check Bulk (automatic Pre/Post detection by market)

Inputs

- Root folder with subfolders like "yyyymmdd_hhmm_step0" (optionally nested by market).

Process

1. Detects PRE/POST candidates by the most appropriate date/time.
2. Excludes folders using a blacklist ("ignore", "old", "bad", "partial", "incomplete", "discard", etc.).
3. Runs Module 2 for each detected market.

Outputs

- Same output structure as module 2, per market.
- Traceability file "FoldersCompared.txt".

SSB Retuning Automations - Modules Included

Module 4 — Final Clean-Up

Inputs

- Final retune working folder.

Process

- Executes final cleanup policies (structure prepared to expand rules).

Outputs

- Versioned cleanup directory according to the active implementation.

Configuration Audit module in detail

SummaryAudit checks philosophy

SummaryAudit sheet contains a high-level checks table by categories. The flow:

1. Excludes "UNSYNCHRONIZED" nodes based on "MeContext".
2. Evaluates NR, LTE, ENDC, Externals, TermPoints, cardinalities, and profiles.
3. Records each check as a row ("Category/SubCategory/Metric/Value/ExtraInfo").

Configuration Audit module in detail

Operational meaning of SummaryAudit rows

- Category: audited technical domain (NR/LTE/ENDC/MeContext/etc.).
- SubCategory: type of analysis (Audit/Inconsistencies/Profiles).
- Metric: specific rule evaluated.
- Value:
  - Integer: number of affected nodes/relations/cells.
  - "N/A": not evaluable due to missing columns.
  - Text: captured status or error.
- ExtraInfo: list of nodes or bounded detail for troubleshooting.

Configuration Audit module in detail

MeContext Audit

Source tables: "MeContext".

Main checks:

- Total unique nodes.
- Nodes with syncStatus="UNSYNCHRONIZED" (excluded from the rest of the audits).

Complete Checks List:

Category	SubCategory	Metric	Tips
MeContext	MeContext Audit	Total unique nodes	MeContext table to create lists of sites for implementation
MeContext	MeContext Audit	Nodes with syncStatus="UNSYNCHRONIZED" (being excluded in all Audits)	Unsynch nodes excluded in Audits and Implementation

Configuration Audit module in detail

NR Frequency Audit / NR Frequency Inconsistencies

Source tables: "NRCellDU", "NRFrequency", "NRFreqRelation", "NRSectorCarrier", "NRCellRelation", "ExternalNRCellCU", "TermPointToGNodeB", "TermPointToGNB".

Main checks:

- Detection of NR nodes with N77 SSB (band 646600–660000).
- Classification of NR nodes as LowMidBand / mmWave / mixed.
- Nodes whose N77 SSBs are fully within allowed PRE or POST lists.
- Nodes with N77 SSB outside allowed lists.
- Old/new SSB presence per node (only old, only new, both).
- Nodes with NRFreqRelationId in an unexpected format (auto-created outside convention).
- NR relations to old/new SSB.
- NR externals and termpoints pointing to old/new/unknown.

Typical triggering:

- Each check is enabled if the table and minimum required columns exist.
- If columns are missing, a "N/A" status row is added.
- If the table is empty or not found, an informative row "Table not found or empty" is added.

Interpretation:

- "Value > 0" in inconsistencies indicates a real deviation that requires investigation.
- "ExtraInfo" typically lists affected nodes for operational targeting.

Complete Checks List:

Configuration Audit module in detail

NR Frequency Audit / NR Frequency Inconsistencies (cont.)

Category	SubCategory	Metric	Tips
NRCellDU	NR Frequency Audit	NR Nodes with ssbFrequency	
NRCellDU	NR Frequency Audit	NR LowMidBand Nodes	
NRCellDU	NR Frequency Audit	NR mmWave Nodes	
NRCellDU	NR Frequency Audit	NR nodes with N77 SSB in band (646600-660000)	
NRCellDU	NR Frequency Audit	NR nodes with N77 SSB in Pre-Retune allowed list (648672, 653952)	Nodes with Step2b pending
NRCellDU	NR Frequency Audit	NR nodes with N77 SSB in Post-Retune allowed list (647328, 653952)	Nodes with Step2b completed
NRCellDU	NR Frequency Inconsistencies	NR nodes with N77 SSB not in Pre/Post Retune allowed lists	These nodes must be checked in preparation phase and confirm if any special action needed
NRSectorCarrier	NR Frequency Audit	NR nodes with N77 ARCFN in band (646600-660000)	
NRSectorCarrier	NR Frequency Audit	NR nodes with N77 ARCFN in Pre-Retune allowed list (650006, 654652, 655324, 655984, 656656)	Nodes with Step2b pending
NRSectorCarrier	NR Frequency Audit	NR nodes with N77 ARCFN in Post-Retune allowed list (650006, 654648, 655320, 655980, 656652)	Nodes with Step2b completed
NRSectorCarrier	NR Frequency Inconsistencies	NR nodes with N77 ARCFN not in Pre/Post Retune allowed lists	These nodes must be checked in preparation phase and confirm if any special action needed
NRFreqRelation	NR Frequency Audit	NR nodes with the old N77 SSB (648672)	
NRFreqRelation	NR Frequency Audit	NR nodes with the new N77 SSB (647328)	
NRFreqRelation	NR Frequency Audit	NR nodes with both, the old N77 SSB (648672) and the new N77 SSB (647328)	
NRFreqRelation	NR Frequency Audit	NR nodes with the old N77 SSB (648672) but without the new N77 SSB (647328)	Need to run Step1 on these nodes

Configuration Audit module in detail

NR Frequency Audit / NR Frequency Inconsistencies (cont.)

Category	SubCategory	Metric	Tips
NRFreqRelation	NR Frequency Audit	NR nodes with some cells missing relations to new SSB (647328)	Nodes with any relations Step1 pending
NRFreqRelation	NR Frequency Audit	NR nodes with the new N77 SSB (647328) NRFreqRelation pointing to mcpcPCellNrFreqRelProfileRef containing new SSB name (cloned) or Other	Nodes with Step1 completed
NRFreqRelation	NR Frequency Inconsistencies	NR nodes with the N77 SSB not in (648672, 647328)	
NRFreqRelation	NR Frequency Inconsistencies	NR nodes with Auto-created NRFreqRelationId to new N77 SSB (647328) but not following VZ naming convention (e.g. with extra characters: "auto_647328")	
NRFreqRelation	NR Frequency Inconsistencies	NR Nodes with the new N77 SSB (647328) and NRFreqRelation reference to McpcPCellNrFreqRelProfile with old SSB before "_" (648672_xxxx)	Need to review Step2b execution
NRFreqRelation	NR Frequency Inconsistencies	NR nodes with the old N77 SSB (648672) and the new SSB (647328) NRFreqRelation pointing to same mcpcPCellNrFreqRelProfileRef containing old SSB name	Need to run Step1 on these nodes
NRFreqRelation	NR Frequency Inconsistencies	NR nodes with mismatching params (cell-level) between old N77 SSB (648672) and the new N77 SSB (647328)	Need to review. Step1 run could solve most cases
NRCellRelation	NR Frequency Audit	NR cellRelations to old N77 SSB (648672)	Post Step2 some relations pointing to other Mkts could be on old SSB. See details in table
NRCellRelation	NR Frequency Audit	NR cellRelations to new N77 SSB (647328)	
ExternalNRCellCU	NR Frequency Audit	External cells to old N77 SSB (648672)	PN and DAS might have no External relations defined
ExternalNRCellCU	NR Frequency Audit	External cells to new N77 SSB (647328)	PN and DAS might have no External relations defined

Configuration Audit module in detail

LTE Frequency Audit / LTE Frequency Inconsistencies

Source tables: "GUtranSyncSignalFrequency", "GUtranFreqRelation", "GUtranCellRelation", "ExternalGUtranCell", "TermPointToENodeB".

Main checks:

- LTE nodes with old/new SSB.
- Nodes with both old/new or old without new.
- SSB outside the expected pre/post set.
- LTE relations to old/new and parameter discrepancies per cell relation.
- LTE externals OUT_OF_SERVICE for old/new.

Complete Checks List:

Configuration Audit module in detail

LTE Frequency Audit / LTE Frequency Inconsistencies (cont.)

Category	SubCategory	Metric	Tips
GUtranFreqRelation	LTE Frequency Audit	LTE nodes with the old N77 SSB (648672)	Need to run Step1 on these nodes
GUtranFreqRelation	LTE Frequency Audit	LTE nodes with the new N77 SSB (647328)	
GUtranFreqRelation	LTE Frequency Audit	LTE nodes with both, the old N77 SSB (648672) and the new N77 SSB (647328)	Nodes with Step1 completed
GUtranFreqRelation	LTE Frequency Audit	LTE nodes with the old N77 SSB (648672) but without the new SSB (647328)	Need to run Step1 on this nodes
GUtranFreqRelation	LTE Frequency Audit	LTE nodes with some cells missing relations to new SSB (647328)	
GUtranFreqRelation	LTE Frequency Inconsistencies	LTE nodes with the N77 SSB not in (648672, 647328)	
GUtranFreqRelation	LTE Frequency Inconsistencies	LTE nodes with Auto-created GUtranFreqRelationId to new N77 SSB (647328) but not following VZ naming convention (647328-30-20-0-1)	Not an issue, unless other inconsistencies raised
GUtranFreqRelation	LTE Frequency Inconsistencies	LTE nodes with same endcB1MeasPriority in old N77 SSB (648672) and new N77 SSB (647328)	Need to review and fix with Step1 or Step2c
GUtranFreqRelation	LTE Frequency Inconsistencies	LTE nodes with mismatching params between GUtranFreqRelationId 648672 and 647328	Parameters qQualMin, qRxLevMin, threshXHigh agreed to set to fixed values on new freqs and inconsistencies should be reported to VZ. Other inconsistent parameters would require review for further actions.
GUtranCellRelation	LTE Frequency Audit	LTE cellRelations to old N77 SSB (648672)	Post Step2 some relations pointing to other Mkts could be on old SSB. See details in table
GUtranCellRelation	LTE Frequency Audit	LTE cellRelations to new N77 SSB (647328)	
ExternalGUtranCell	LTE Frequency Audit	External cells to old N77 SSB (648672)	
ExternalGUtranCell	LTE Frequency Audit	External cells to new N77 SSB (647328)	
ExternalGUtranCell	LTE Frequency Audit	External cells to old N77 SSB (648672) with serviceStatus=OUT_OF_SERVICE	Externals with unavailable TermPoints are not operational for ENDC and might not be updated immediately after Step2
ExternalGUtranCell	LTE Frequency Audit	External cells to new N77 SSB (647328) with serviceStatus=OUT_OF_SERVICE	

Configuration Audit module in detail

Termpoint Audit / Termpoint Inconsistencies

Source tables: "TermPointToGNodeB", "TermPointToENodeB", "TermPointToGNB".

Complete Checks List:

Category	SubCategory	Metric	Tips
TermPointToGNodeB	NR Termpoint Audit	NR to NR TermPoints with administrativeState=LOCKED	
TermPointToGNodeB	NR Termpoint Audit	NR to NR TermPoints with operationalState=DISABLED	
TermPointToENodeB	X2 Termpoint Audit	NR to LTE TermPoints with administrativeState=LOCKED	Helpful to troubleshoot External updates
TermPointToENodeB	X2 Termpoint Audit	NR to LTE TermPoints with operationalState=DISABLED	Helpful to troubleshoot External updates
TermPointToGNB	X2 Termpoint Audit	LTE to NR TermPoints with administrativeState=LOCKED	Helpful to troubleshoot External updates
TermPointToGNB	X2 Termpoint Audit	LTE to NR TermPoints with operationalState=DISABLED	Helpful to troubleshoot External updates
TermPointToGNB	X2 Termpoint Audit	LTE to NR TermPoints with usedIpAddress=0.0.0.0/::	Helpful to troubleshoot External updates

Configuration Audit module in detail

ENDC Audit / ENDC Inconsistencies

Source tables: "EndcDistrProfile", "FreqPrioNR".

Main checks:

- "gUtranFreqRef" and "mandatoryGUtranFreqRef" with old/new + N77B combinations.
- Nodes that do not contain the expected frequency combination.
- In "FreqPrioNR": old without new, both present, and parameter mismatch per cell.

Complete Checks List:

Category	SubCategory	Metric	Tips
EndcDistrProfile	ENDC Audit	Nodes with gUtranFreqRef containing the old N77 SSB (648672) and the N77B SSB (653952)	Need to run Step2c on this nodes
EndcDistrProfile	ENDC Audit	Nodes with gUtranFreqRef containing the new N77 SSB (647328) and the N77B SSB (653952)	Nodes with Step2c completed
EndcDistrProfile	ENDC Audit	Nodes with mandatoryGUtranFreqRef containing the old N77 SSB (648672) and the N77B SSB (653952)	Need to run Step2c on this nodes
EndcDistrProfile	ENDC Audit	Nodes with mandatoryGUtranFreqRef containing the new N77 SSB (647328) and the N77B SSB (653952)	Nodes with Step2c completed
EndcDistrProfile	ENDC Inconsistencies	Nodes with gUtranFreqRef not containing N77 SSBs (648672 or 647328) together with N77B SSB (653952)	Need to run Step1 on this nodes
EndcDistrProfile	ENDC Inconsistencies	Nodes with mandatoryGUtranFreqRef not empty and not containing N77 SSBs (648672 or 647328) together with N77B SSB (653952)	These nodes must be checked in preparation phase and confirm if any special action needed
FreqPrioNR	ENDC Audit	LTE nodes with the old N77 SSB (648672) but without the new N77 SSB (647328)	Need to run Step1 on this nodes
FreqPrioNR	ENDC Audit	LTE nodes with both, the old N77 SSB (648672) and the new N77 SSB (647328)	Nodes with Step1 completed
FreqPrioNR	ENDC Audit	NR nodes with RATFreqPrioId = "fwa" in N77 band	
FreqPrioNR	ENDC Audit	NR nodes with RATFreqPrioId = "publicsafety" in N77 band	
FreqPrioNR	ENDC Inconsistencies	LTE nodes with mismatching params (cell-level) between FreqPrioNR 648672 and 647328	
FreqPrioNR	ENDC Inconsistencies	NR nodes with RATFreqPrioId different from "fwa"/"publicsafety" in N77	These nodes must be checked in preparation phase and confirm if any special action needed

Configuration Audit module in detail

Cardinalities Audit / Inconsistencies

Cardinality checks per relation table (per node and/or per cell) to detect overprovisioning or gaps versus expected limits.

Complete Checks List:

Category	SubCategory	Metric	Tips
Cardinality NRFrequency	Cardinality Audit	Max NRFrequency definitions per node (limit 64)	These nodes must be checked in preparation phase and confirm if any special action needed
Cardinality NRFrequency	Cardinality Inconsistencies	NR nodes with NRFrequency definitions at limit 64	These nodes must be checked in preparation phase and confirm if any special action needed
Cardinality NRFreqRelation	Cardinality Audit	Max NRFreqRelation per NR cell (limit 16)	These cells must be checked in preparation phase and confirm if any special action needed
Cardinality NRFreqRelation	Cardinality Inconsistencies	NR cells with NRFreqRelation count at limit 16	These cells must be checked in preparation phase and confirm if any special action needed
Cardinality GUtranSyncSignalFrequency	Cardinality Audit	Max GUtranSyncSignalFrequency definitions per node (limit 24)	These nodes must be checked in preparation phase and confirm if any special action needed
Cardinality GUtranSyncSignalFrequency	Cardinality Inconsistencies	LTE nodes with GUtranSyncSignalFrequency definitions at limit 24	These nodes must be checked in preparation phase and confirm if any special action needed
Cardinality GUtranFreqRelation	Cardinality Audit	Max GUtranFreqRelation per LTE cell (limit 16)	These cells must be checked in preparation phase and confirm if any special action needed
Cardinality GUtranFreqRelation	Cardinality Inconsistencies	LTE cells with GUtranFreqRelation count at limit 16	These cells must be checked in preparation phase and confirm if any special action needed

Configuration Audit module in detail

Profiles Audit (if enabled)

- Compares PRE/POST profiles by supported profile MO.
- Detects parameter discrepancies between old/new variants.
- Adds results to SummaryAudit and auxiliary detail sheets.

Complete Checks List:

Configuration Audit module in detail

Profiles Audit (if enabled) (cont.)

Category	SubCategory	Metric	Tips
McpcPCellNrFreqRelProfileUeCfg	Profiles Inconsistencies	Profiles with old N77 SSB (xxxx_648672) but not new N77 SSB (xxxx_647328)	Need to review profile consistency before/after retune
McpcPCellNrFreqRelProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672_xxxx) but not new N77 SSB (647328_xxxx)	Need to review profile consistency before/after retune
McpcPCellNrFreqRelProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
TrStSaNrFreqRelProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672_xxxx) but not new N77 SSB (647328_xxxx)	Need to review profile consistency before/after retune
TrStSaNrFreqRelProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672_xxxx) but not new N77 SSB (647328_xxxx)	Need to review profile consistency before/after retune
TrStSaNrFreqRelProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McpcPCellProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
McpcPCellProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McpcPSCellProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
McpcPSCellProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
UlQualMcpcMeasCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
UlQualMcpcMeasCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McfbCellProfile	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
McfbCellProfile	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McfbCellProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune

Configuration Audit module in detail

Profiles Audit (if enabled) (cont.)

Category	SubCategory	Metric	Tips
McfbCellProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
TrStSaCellProfile	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
TrStSaCellProfile	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
TrStSaCellProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
TrStSaCellProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
CaCellProfile	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
CaCellProfile	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
CaCellProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
CaCellProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McpcPCellEUtranFreqRelProfile	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
McpcPCellEUtranFreqRelProfile	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
McpcPCellEUtranFreqRelProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
McpcPCellEUtranFreqRelProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
UeMCEUtranFreqRelProfile	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
UeMCEUtranFreqRelProfile	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune

Configuration Audit module in detail

Profiles Audit (if enabled) (cont.)

Category	SubCategory	Metric	Tips
UeMCEUtranFreqRelProfileUeCfg	Profiles Inconsistencies	Retuned nodes and Profiles with old N77 SSB (648672) but not new N77 SSB (647328)	Need to review profile consistency before/after retune
UeMCEUtranFreqRelProfileUeCfg	Profiles Discrepancies	Retuned nodes and Profiles with old N77 SSB (648672) and new N77 SSB (647328) but with param discrepancies	Need to review profile discrepancies before/after retune
NRCellCU	Profiles Inconsistencies	Retuned nodes with NRCellCU Ref parameters to Profiles with the old SSB name	Need to review profile consistency before/after retune
EUtranFreqRelation	Profiles Inconsistencies	Retuned nodes with EUtranFreqRelation Ref parameters to Profiles with the old SSB name	Need to review profile consistency before/after retune

Configuration Audit module in detail

Detailed check execution order and gating rules

1. MeContext pre-processing
   - Computes total nodes and "UNSYNCHRONIZED" nodes.
   - Builds an exclusion list and filters all other MO dataframes by "NodeId" before running any other checks.
2. Node scoping for Pre/Post interpretation
   - "NRCellDU" checks run first because they generate the rows used to infer node scope (Pre-retune vs Post-retune).
   - This scope is reused by relation/externals/termpoint checks to classify targets ("SSB-Pre", "SSB-Post", "Unknown").
3. Per-table processors
   - NR processors: "NRFrequency", "NRFreqRelation", "NRSectorCarrier", "NRCellRelation".
   - LTE processors: "GUtranSyncSignalFrequency", "GUtranFreqRelation", "GUtranCellRelation".
   - Externals/Termpoints: "ExternalNRCellCU", "ExternalGUtranCell", "TermPointToGNodeB", "TermPointToGNB", "TermPointToENodeB".
   - ENDC/Cardinality/Profile processors follow and append their own rows.
4. Resilience model
   - If a table is missing/empty: emits "Table not found or empty" metric rows.
   - If required columns are missing: emits "N/A" rows.
   - If exceptions occur: emits "ERROR: ..." rows without aborting the full SummaryAudit generation.

Configuration Audit module in detail

Additional columns injected into parsed MO sheets

Besides SummaryAudit, Module 1 enriches several raw MO sheets with operational columns for execution/cleanup.

`MeContext` enrichment (main planning helper)

Additional columns are computed per "NodeId" by aggregating NR/LTE relation tables:

- Topology and inventory:
  - "mmWave Cells", "LowMidBand Cells", "N77 Cells"
  - "N77A old SSB cells", "N77A new SSB cells"
- Relation counters:
  - "NRFreqRelation to old N77A SSB", "NRFreqRelation to new N77A SSB"
  - "GUtranFreqRelation to old N77A SSB", "GUtranFreqRelation to new N77A SSB"
- Priority snapshots (unique consolidated values):
  - "NRFreqRelation to old N77A SSB cellReselPrio"
  - "NRFreqRelation to new N77A SSB cellReselPrio"
  - "GUtranFreqRelation to old N77A SSB cellReselPrio"
  - "GUtranFreqRelation to new N77A SSB cellReselPrio"
  - "GUtranFreqRelation to old N77A SSB EndcPrio"
  - "GUtranFreqRelation to new N77A SSB EndcPrio"
- Workflow recommendation fields:
  - "Step1", "Step2b", "Step2ac", "Next Step", "EndcPrio Next Step"

Operational interpretation:

- "Step1" focuses on old/new relation parity and reselection-priority convergence.
- "Step2b" focuses on old/new N77A cell presence.
- "Step2ac" focuses on ENDC priority transition validation.
- "Next Step" concatenates pending actions to provide a single execution hint per node.

Configuration Audit module in detail

Additional columns injected into parsed MO sheets (cont.)

`NRCellRelation` and `GUtranCellRelation` enrichment

Both relation tables are normalized with helper columns used for discrepancy targeting and command generation:

- "Frequency" extracted from relation references.
- External endpoint decomposition fields (function/cell identifiers parsed from references).
- "GNodeB_SSB_Target" classification ("SSB-Pre"/"SSB-Post"/"Unknown").
- "Correction_Cmd" prebuilt command text for the rows considered actionable.

`ExternalNRCellCU` and `ExternalGUtranCell` enrichment

- Adds "Frequency", "Termpoint", "TermpointStatus", "TermpointConsolidatedStatus".
- Adds "GNodeB_SSB_Target" and "Correction_Cmd" for retune remediation flows.
- For LTE externals, service state ("OUT_OF_SERVICE") is also reflected in SummaryAudit checks.

`TermPointToGNodeB` / `TermPointToGNB` enrichment

- Adds consolidated termpoint health/status fields and "SSB needs update" boolean.
- Adds "GNodeB_SSB_Target" and generated "Correction_Cmd" when target and frequency logic indicates migration to post-retune SSB.

Configuration Audit module in detail

Key SummaryAudit checks by source table (implementation-level)

Below is the practical checklist implemented by the processors:

- NRCellDU:
  - Node classification LowMidBand/mmWave/mixed.
  - N77-in-band detection.
  - Allowed pre/post SSB-list compliance and out-of-list inconsistencies.
- NRFrequency:
  - old/new/both/old-without-new presence by node.
  - values outside expected old/new sets.
- NRFreqRelation:
  - old/new/both/old-without-new relation presence.
  - naming-convention checks for auto-created relation IDs.
  - cell-level old-vs-new parameter mismatch detection.
  - profile reference transition checks (old profile clones vs expected post clone).
- NRSectorCarrier:
  - allowed ARFCN list compliance (pre/post).
  - out-of-list inconsistencies.
- NRCellRelation:
  - relation counts to old/new targets.
  - extraction/parsing consistency from "nRFreqRelationRef".
- GUtranSyncSignalFrequency:
  - old/new/both/old-without-new LTE presence by node.
  - out-of-set inconsistencies.
- GUtranFreqRelation:
  - old/new/both/old-without-new checks.
  - naming convention validation ("<ssb>-30-20-0-1" style)

Configuration Audit module in detail

Key SummaryAudit checks by source table (implementation-level) (cont.)

- GUtranCellRelation:
  - relation counts to old/new LTE targets.
- ExternalNRCellCU / ExternalGUtranCell:
  - old/new external references counts.
  - target classification and termpoint correlation.
- TermPoint tables:
  - locked/disabled/unhealthy transport endpoint detection.
  - alignment with external-cell update needs.
- EndcDistrProfile / FreqPrioNR:
  - expected old/new + N77B combinations.
  - unexpected combinations and param discrepancies.
- Cardinality checks:
  - hard-limit and threshold checks per node/cell relation families.
  - explicit inconsistency rows when limits are reached/exceeded.

Consistency Check module in detail

Filtering by non-retuned nodes

If a POST SummaryAudit exists, the module obtains PRE/POST node lists and can exclude discrepancies whose target points to nodes that did not complete retune, reducing operational noise.

Consistency Check module in detail

How it detects parameter discrepancies

1. Selects common PRE and POST relations by composite key:
    - GU: typically "NodeId", "EUtranCellFDDId", "GUtranCellRelationId".
    - NR: typically "NodeId", "NRCellCUId", "NRCellRelationId".
2. Excludes control columns (keys, frequency, Pre/Post, Date).
3. Compares value-by-value across shared columns.
4. Sets "ParamDiff=True" if at least one column differs.
5. In GU it ignores "timeOfCreation" and "mobilityStatusNR" to avoid false positives.

Consistency Check module in detail

How it detects frequency discrepancies

1. Extracts base frequency from relation references ("extract_gu_freq_base" / "extract_nr_freq_base").
2. Discrepancy rule:
    - if PRE had "freq_before" or "freq_after", and POST does not end up in "freq_after", it marks "FreqDiff=True".
3. Classifies the discrepancy as:
    - "FreqDiff_SSBPost" (target identified as SSB-Post),
    - "FreqDiff_Unknown" (cannot be associated to a known target).

Consistency Check module in detail

How it detects neighbor discrepancies

They are split into three groups:

- New relations: keys present in POST and absent in PRE.
- Missing relations: keys present in PRE and absent in POST.
- Discrepancies: same key in PRE/POST but with parametric or frequency differences.

Consistency Check module in detail

Content of each ConsistencyChecks output sheet

- Summary: KPIs per table (PRE/POST volume, discrepancies, new/missing, source files).
- SummaryAuditComparisson: diff of SummaryAudit PRE vs POST metrics (without "ExtraInfo" to keep the comparison clean).
- Summary_CellRelation: KPI per "Freq_Pre/Freq_Post" pair and per technology.
- GU_relations / NR_relations: relation universe enriched with target classification and command snippets.
- GU_param_disc / NR_param_disc: common relations with param differences.
- GU_freq_disc / NR_freq_disc: frequency discrepancies to SSB-Post targets.
- GU_freq_disc_unknown / NR_freq_disc_unknown: discrepancies with non-classifiable targets.
- GU_missing / NR_missing: relations removed versus PRE.
- GU_new / NR_new: relations added in POST.
- GU_all / NR_all: optional consolidated dump for extended analysis.

Quick module reference

Module	Main input	Main output	Goal
0 Update Network Frequencies	Logs folder	Persisted config	Update network frequency list
1 Configuration Audit	Logs/ZIP folder	Excel + PPT + CA commands	Audit configuration and profiles
2 Consistency Check	PRE and POST folders	2 Excel + CC commands	Compare pre/post relations
3 Consistency Check (Bulk)	Multi-market root folder	Module 2 outputs per market	Run bulk comparison
4 Final Clean-Up	Final folder	Clean-up folder	Operational final clean-up

Inputs Naming Convention

- Keep market log exports in a consistent structure and following the below naming convention (for both the parent folder and the zip file contining Step0 logs):
  - Recommended naming convention for folders and zips: "<TIMESTAMP>_Step0_<MARKET_ID>_<MARKET_NAME>_<PHASE>"
  - Example: "20260217_0500_Step0_Mkt188_Omaha_PreStep1/20260217_0500_Step0_Mkt188_Omaha_PreStep1.zip"

Naming Convention	"<TIMESTAMP>_Step0_<MARKET_ID>_<MARKET_NAME>_<PHASE>/<TIMESTAMP>_Step0_<MARKET_ID>_<MARKET_NAME>_<PHASE>.zip"
Example PreStep1	"20260217_0500_Step0_Mkt188_Omaha_PreStep1/20260217_0500_Step0_Mkt188_Omaha_PreStep1.zip"
Example PostStep1	"20260217_0630_Step0_Mkt188_Omaha_PostStep1/20260217_0630_Step0_Mkt188_Omaha_PostStep1.zip"

Operational Best Practices

- Validate that PRE/POST have the same table granularity and consistent naming.
- Validate frequency inputs ("n77_ssb_pre", "n77_ssb_post", "n77b_ssb") before batch execution.
- Correctly configure allowed SSB/ARFCN lists to minimize false positives.
- Run Configuration Audit before Consistency Checks whenever possible.
- Use Bulk mode only with a controlled folder naming convention.
- Review "Summary" and "Summary_CellRelation" first, then then deep-dive into detail sheets (ConfigurationAudit) and discrepancy tabs (ConsistencyCheck).
- Consume "Correction_Cmd_CA" and "Correction_Cmd_CC" as a remediation proposal, not as blind execution.

Known limitations and considerations

- The engine depends on log quality and structure: missing columns downgrade checks to "N/A".
- Some rules depend on naming conventions in references (NR/GU relation refs).
- The Final Clean-Up module is prepared to extend operation-specific policies.