**3GPP Specification Process Automation**

# Introduction

Following the discussions in the ETSI NWM Program Oversight Committee and the results of an extensive survey of 3GPP contributors, it is intended to introduce automation to improve the efficiency of implementing CRs into the 3GPP specifications, minimising errors and manual intervention. The goals are:

1. Automatically verify CRs written in MS Word to ensure that they are implementable and follow 3GPP’s drafting rules, including:
	1. Using correct template
	2. Using correct styles (with no variations that would impair automated implementation into the specifications)
	3. Identifying any clashes with other open CRs (i.e. which have been verified but not implemented into the specifications).
2. Automatically implement a next version of a specification from the previous version plus a set of verified CRs.

This document provides more detail on these requirements, especially the aspects of a CR to be verified, with the intent of providing consultants with the necessary scope to identify solutions with the potential to be developed to achieve the goals.

# Detailed requirements for automated verification of a CR

## File aspects for acceptable input and output

1. File format of the CR that is created, edited, etc. by users shall be .docx.

(NOTE: This requirement does not necessarily assume that the CR has to be stored in docx format: consideration of other back-end storage formats, e.g. using databases, are not precluded. The intention of the CR in .docx format is that this is what users will create and edit, and the new tool must accept this as input for checking and implementing against 3GPP specifications.)

1. For submission at working group level, the CR tdoc file should follow tdoc naming convention: xm*i*nnzzzz or xm*i*nnzzzzz as described in [article 34 of the working procedures](https://www.3gpp.org/ftp/Information/Working_Procedures/3GPP_WP.htm#Article_34) where:

x = a single letter corresponding to the TSG

m = a single character corresponding to the WG within the TSG (e.g. 1), or ‘P’ in the case of the TSG itself

i = typically the character ‘-‘. May take on other values depending on the nature of the meeting at which the document is presented, e.g., the identity of a subgroup.

nn = two digits indicating the year

zzzz or zzzzz = unique number of the document

Additional text is permissible in the tdoc filename, but not in the zipped archive: e.g. R1-231234\_CR\_on\_blabla.docx is ok, but shall be zipped as R1-231234.zip

1. CRs submitted in CR packs to TSG plenaries should follow the naming convention
*<specnumber>*\_CR*<CR#>*[r*<rev#>*]>\_(*<Release>*)\_[*<WG Tdoc#*>[\_*<optional free text>*]].docx.
For instance 24301\_CR1234r8\_(Rel-17)\_C1-236789\_correction\_on\_blabla.docx
2. Associated content related to the CR (e.g. source files for figures, XML, source code, equations) shall be associated with the CR in such a way that they can be submitted, retrieved, edited, etc.

(Note: Such associated content could be included in the same zip archive. The technical solution for this requirement is not in scope of the requirements.)

## Meta data aspects

1. Meta data for an input CR shall be provided using the latest official template (available from <https://www.3gpp.org/ftp/Information/All_Templates> or generated by the 3GPP portal upon tdoc number allocation).
2. Data on the cover sheet shall be in line with what was provided at the time of number allocation: title, source, spec, etc; i.e., it shall be consistent with the 3GPP CR database.

(NOTE: some changes to the cover sheet cannot be done after submission, e.g. changes to the CR title. In case of changes e.g. during the meeting, a delegate could seek to modify these 'fixed' fields. In this case, some solution is needed so that the author can accomplish this task. For example, the delegate could make the secretary aware of changes to 'fixed' fields in the CR that, so that data can be aligned.

1. Text on the cover sheet shall not include revision marks.
2. All fields of the cover page shall be filled in correctly and shall be verified for consistency with the 3GPP databases for meetings, CRs, tdocs, specifications and Work Items as appropriate. *(Note that many of these aspects have already been implemented by ETSI MCC.)*
	1. Header:
		1. Group, meeting and start/end dates
		Verify the tdoc header (group, date, location) vs. tdoc database or schedule.
	2. Tdoc number:
		1. shall correspond to the tdoc number indicated in the tdoc filename and archive
		Verify tdoc number vs. tdoc database
	3. Specification:
		1. Number shall be valid and use format xx.yyy[-part number]. The spec number shall **not** be prefixed by “TS” or “TR”.
		Verify the specification format & # vs. spec database
	4. CR:
		1. Number shall be as allocated by the portal with padding with zeros for numbers with less than 4 digits, e.g. 0038
	5. Revision:
		1. Number shall be as allocated by the portal or the secretary. For the initial version , ‘-‘ shall be used (‘0’ is not permissible).
		2. Number shall be incremented at each revision (i.e., the first revision would be 1).
		Verify the revision number vs. tdoc database and CR database.
	6. Release:
		1. Format Rel-X shall be used.
		Check the format of the Release field and content vs. the CR database.
		Check if there is a missing mirror [resulting in a warning or error]
	7. Current version:
		1. Version shall be the highest version available for the release. If no version is available yet for the release, then the highest version available for release N-1 shall be used.
		2. A version with a lower editorial version number (3rd digit of vX.Y.Z) is permissible. If the CR is further revised, the version needs to be updated.
		3. Note: CRs are meant for specs under change control, therefore version shall be higher than 3.0.0
		Verify the format and current version vs. spec database.
	8. Category:
		1. Shall be in {A, B, C, D, F}
		Verify the category vs. CR database & spec database as needed (to check if mirrors have been provided properly.)
	9. Title:
		1. Free text
		Verify the title vs. CR database (to ensure it does not change without updating the CR database)

(A warning could be generated if the CR is for a TEI item and the TEI unique identifier is not included in the title.)

* 1. Source to WG:
		1. List of supporting companies (only confirmed ones: the list shall not contain question marks). The list may include MCC.
		2. Supporting companies shall not include any that are not members of 3GPP.
		3. Empty in case of direct company contribution to TSG without earlier presentation to the WG.
		Verify Source to WG format; if present, must be legitimate IMs in the member database.
		Verify source vs. CR database (there have been problems in the past with CR revs being offered by competing companies and causing confusion – this should at least generate a warning).
	2. Source to TSG:
		1. In case of submission to TSG by the working group, two characters designating the WG, e.g. C1 or R5.
		2. In case of direct company contribution to TSG, list of supporting companies (only confirmed ones: the list shall not contain question marks). The list may include MCC.
		3. Supporting companies shall not include any that are not members of 3GPP.
		Verify source to TSG format, and the source is either a WG, or legitimate IMs in the member database
		Verify that the source to TSG includes at least the companies in the CR's previous revision in the CR database, and otherwise issue a warning (there has been confusion in the past when competing CRs revisions have been submitted by different groups of IMs)
	3. Reason for changes, Summary of changes, Consequences if not approved:
		1. Free text
		Verify these fields are present.
	4. Date:
		1. Shall follow format yyyy-mm-dd
		Verify this field is present and changes to the current date every time submitted. (could issue a warning or helpfully suggest to change it.)
	5. Work items:
		1. Comma-separated list of valid work items codes.
		2. Work items shall belong to the same release as the CR.

Note: Work items from an earlier release are permissible (in case of mirrors, or when accompanied by TEIx as described in clause 6.2 of 21.900).

* + 1. Work items codes shall be the same for all mirror CRs (i.e. Cat-A .
		Verify the WIC is present and a valid WIC for the release, or mirror; use of TEI as per 21.900.
	1. Proposed change affects (aka “affected entities”):
		1. At least one appropriate box should be marked with ‘X’
		Verify the proposed change affects (tick boxes) – if none are ticked, issue a warning (some editorial [cat D] CRs have no impact. Some have impact in areas that are not covered - e.g. application impact only.)
	2. Clauses affected:
		1. The list shall include all clauses that are affected by the CR. Each subclause shall be listed individually: e.g. “4.1, 4.2, 4.3” and not just “4”.
		Verify that the clauses affected are present with correct granularity (e.g. 4.1 not 4 if 4.1 has the change); verify that the indicated clauses correspond to changes in the content of the CR; warn of ambiguous indication of new clauses (e.g. 6.X, 6.X is ambiguous: should be 6.X.Y, 6.X.Z); verify that the change is to a section that exists (e.g. a change to 19.3.5, where there is no clause 19 in the specification, is an error)
	3. Other specs affected:
		1. One of the Y/N boxes shall be marked with ‘X’.
		2. If ‘Y’ is marked, spec(s) and CR(s) shall be listed. Tdoc numbers shall not be used.
		Verify that tick boxes are be selected.
		Verify, if other specs are listed, that these specs exist.
		Verify if CRs listed, that they are in the proper format and vs CR database that they exist.
		Verify that tdocs are not be given in the other specs affected text.
	4. Other comments:
		1. Free text; no verification needed.
	5. This CR's revision history:
		1. Free text?
		Verify some revision history given each revision and issue a warning if this is not done, to encourage the use of the field.

## Body aspects

1. All changes shall follow the 3GPP drafting rules (TR 21.801).
Changes should be checked contextually, e.g. so that a change to terminology that is not in EX style is an error, the header or footer of a table exists and is in TH or TF respectively. Check that anything in EN (Editor's Note style) begins with the text "Editor's Note:<tab>", and so on.
2. Affected clauses shall be copied in full from the latest approved version of the specification (that is indicated on the cover sheet).
Note 1: in case of mirrors, this needs to be done individually for each release, as the content may be different in the releases.
Note 2: in case of resubmission of a CR presented in an earlier plenary cycle, the author shall update the CR to the latest reference version, if a new spec version is available.
Verify all change marked material is in a clause that is listed as a 'clause affected.
Verify that the latest text (from the reference version of specification) is used as the basis for the CR.
3. Unaffected clauses shall not appear.
Verify that all clauses listed as changes have changes.
4. Revision marks (using the MS Word change-tracking feature, not imitated with formatting) shall be used for all modifications relative to the latest approved version of the specification, including addition, deletion or modification of text, changes of styles, etc.
Verify that header text is in Header format not 'resized', etc. Warnings in the case of any possible 'emulated style' - often done instead of TH and TF, for example.
Modifications not indicated by revision marks shall not be present.
Verify the clauses affected to identify if any text that is *not change marked* has changed from the specification. This is an error.
Changes to figures, equations, source code, etc. where there is corresponding source code can be compared: if there is no change to the source code but a change to the figure, or no change to the figure but a change to the source code - these could be warnings or errors.
Verify that changes in style are change marked. Sometimes these changes are 'accepted' by the delegate (in some WGs not including change marks for changes in style is mandatory) - so style changes without revision marks should only result in a warning not an error.
5. Changes on changes are not permissible.
Verify no changes on changes are present in a CR. If these exist, a helpful option would be to produce a 'clean version' without changes on changes automatically.
6. Only styles of the official stylesheet shall be used. Those styles shall not be modified.
Verify that styles have not been modified. NOTE that it is very easy to do this, e.g. by having different MS word settings, such as Language. The strictness of a violation of this has to be determined as part of the analysis of the new tool technical specification - whether to issue a warning or error.
7. Correct style shall be used for a given purpose. No “mimicking” to make a text look like the correct style by the means of additional tabs, spaces and so on.
Verify that larger, bold, use of specific fonts, etc. text is not being used directly above / below figures, as table notes, etc. in place of proper styles.
8. Equations, figures and diagrams shall be included using tools listed in clause H.5 of TR 21.801. Changes to such items should be indicated by revision marks.
Nice-to-have: If associated files are provided:
The new tool shall support input of equations, figures, code, diagrams, etc. using the supported tools.
Verify the correctness of the input (e.g. ancillary file) if possible.
Verify (or even automate) the content generated from the source code.
9. Any addition of a numbered item (e.g. clause heading or figure number) should use an undefined value: for instance 3.X and not explicitly 3.5. The latter may cause clashes with other CRs.
Verify new clause numbers are not given but are rather left as variables.
10. Orphan text (i.e. text between a first-level heading and the next-level heading) is not permitted.
Verify content is not added *without* creating a new clause where this would result in a hanging paragraph.
11. Non-successive clauses shall be separated using an indicator such as “< Next change >”.
Verify the boundaries between changes comply with the CR template or other rules established for the new tool.
12. Clauses shall appear in the same order as they appear in the specification, e.g. do not put clause 5 before clause 3.
Verify the clauses changed are in order.
13. Acronyms in inserted text shall be checked against the acronyms list in the affected specification, or in TR 21.905 if absent in the affected specification. If an acronym is neither already in the list nor in TR 21.905, the clauses affected by the CR shall include the acronyms list and the new acronym shall be included there.
Verify acronyms in CR text are in the acronyms list in the affected specification, or in TR 21.905 if absent in the affected specification. If an acronym is neither already in the list nor in TR 21.905, the clauses affected this is considered an error. NOTE: if acronyms are added as part of the CR this could resolve the error.

## Identification of clashes between CRs

The new tool shall be able to identify clashes between sets of two or more CRs.

As a minimum, a set of CRs for the same TS or TR that have passed the verification step should be able to be automatically checked for clashes.

This should identify whether or not any CRs in the set affect the same portion of a TS or TR such that they cannot be unambiguously implemented together. Clashing portions should be identified at the lowest level of granularity possible, e.g. at the level of a sentence, figure or equation.

Verify a set of two or more CRs to the same spec/version against each other to determine if they modify the same text, figure or other content. This clash is an error.

# Detailed requirements for automated implementation of a CR

If a CR has successfully passed the verification step, the tool shall be able to implement it automatically into the relevant specification document (TS) or technical report document (TR) and produce two versions of the target TS or TR, one clean and one with revision marks.

The new tool shall support implementation of a CR any user – not only secretaries – to allow for off-line work.

The output should be a new version of the TS or TR identified on the cover page of the CR. Normally only the middle “y” of the TS or TR number vX.Y.Z would be incremented in this process.

It needs to be possible to implement automatically multiple CRs into the same increment of a specification version if it has been confirmed (see “identification of clashes between CRs” above) that the CRs do not clash.

The new tool’s output from the implementation process should identify any ambiguity or issues in the automation to allow iterative modification of CRs and the tool to create a correct output.

The tool’s output of target specifications shall use proper naming conventions (at least the version numbering on the header page and file name).

The tool’s output of target specifications shall be possible for ‘interim specifications’ (not only at the end of quarters), for WGs that meet multiple times in a quarter. (NOTE: These interim specifications are useful to prepare CRs in the second meeting of a quarter to avoid clashes with previous CRs.)

# Example solutions

A typical solution would enable:

* a CR or set of CRs to be input to a tool for verification; the output being notification of passing or a report of failure reasons.
* a set of successfully verified CRs to be input to a tool for identification of clashes; the output being notification of passing or a report of identified clashes.
* a new TS or TR version to be produced by the tool from a set of CRs that have successfully passed steps 1 and 2.

# Target timescale

The target timescale would be to have the tools in place in time for testing in advance of the Release 20 specifications, e.g. by the end of 2024.