|  |
| --- |
| ***STF 576 - Final Report for ETSI*** |
| **Presented to ETSI meeting** |  MTS #81 |  | **Author:** | Mr. Michele Carignani |
|   |   |   | **Date:** | 31/07/2020 |
| **Doc ref** |  MTS(20)081002 |   | **Version** | 1.0  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **STF** | **576** |   | **STF leader** | Mr. Michele Carignani |
| **TB/WG** | **MTS** |   | **TB responsible** | Mr. Dirk Tepelmann |
|  |  |   | **Administrator** | Ms. Elodie Rouveroux |
|  |  |  |  |  |  |
| **STF title:** | Survey of current work and definition of a methodology for specification and testing of RESTful APIs  |
|  |  |  |  |  |  |
| **Milestone** | **C1** |  | **Status** | **Covers the period until (cut-off date)** | 30/06/2020 |
|  **Template** |
| **Objective** | Final draft DEG/MTS-203647 approved by TC MTS (Remote Consensus - RC) and accepted by the ETSI Secretariat for publication. STF Final Report approved by TC MTS (RC). |
| **Achieved** | Yes | *Indicate whether the objective has been achieved* |
| *If the objective is not achieved, give a short explanation in the “remarks”* |
| **Remarks** |   |
|  |  |  |  |  |  |
| **Achieved dates** |  |  |  |  |  |
| **Template** | **Draft report** | **TB approval** | **ETSI approval** |  |  |
| 02/06/2020 |  29/07/2020 |   |   |   |   |
|  |  |  |  |  |  |
|  |

# Executive summary

STF 576 has been tasked to conduct a survey of current practices of RESTful APIs standardization activities and to develop a Guide presenting a unified methodology suitable for ETSI Technical Bodies and Specification groups.

Milestone A, which was achieved in January 2020 and described in the previous Progress Report, included the results of work done in Tasks T1, T2 and T3 which has been successfully executed by STF 576. As a result of the work developed an early draft of ETSI EG 203 647 has been contributed to MTS #79 plenary meeting. The draft contained the foreseen structure of the document and the result of the analysis of the base documents.

Milestone B, incorporates the results of results of Tasks T4 and T5. The tasks have been in the foreseen timeframe and with the planned resources, allowing the production of a Stable Draft for the target deliverable.

A modification for the time plan for Milestones C and D has been proposed and approved, to take into account the special process required for approval and publication of EG deliverables (ETSI Guide).

With the approval in TC MTS of the Final Draft of EG 203 647, Milestone C has been achieved, with a minor delay with respect to the original plan.

While the vote and finalization of the document are dealt with at the ETSI level, the STF has planned and implemented a dissemination plan to maximize the benefits of this funded activity so that the targeted ETSI communities could be enabled to get awareness of the document and to provide the feedback to future developments of the Guide.

Overall the STF has delivered the target deliverable, making all efforts to ensure the best quality of the outcome and to empower ETSI membership with a modern methodology which is in line with best practices and specifications already in place.

# Introduction

More and more telecommunication and digital interfaces are being implemented as software-based solutions. Moreover, a well-known and adopted design methodology is taking place across several standardization activities: using the REpresentational State Transfer (REST) paradigm and resource-oriented protocols (e.g. HTTP(S), CoAP) or other possibly applicable protocols (MQTT, AMQ).

This phenomenon is spreading in both ETSI and its Partnership Projects standardization activities, across several technologies, often quite different in nature.

As adoption of standardizing RESTful APIs rises, it is becoming clearer that “REST API” specification needs to be:

* **Fast**: the interfaces are simpler than other approaches and tend to have a shorter lifespan;
* **Automatable**: given the high number of conventions in the design of an API, parts of the specification, implementation and testing process are well suited to be automated;
* **Developer friendly**: developers need support in the discovery and implementation of the interfaces by using tools and methodologies more closely aligned with software development.

The development of official ETSI guides for REST API specification and testing will support:

- **Consolidation of efforts**: TBs and PPs would be able to leverage from others’ experience

- **Delivery time** of specifications

- **Standards quality** (specification, testability, interoperability)

While several TBs and ISGs have already specified REST APIs and related guidelines, other work will be carried out during 2020 and it’s strategic to align and consolidate the standardization efforts.

In this view, STF 576 has been initiated to follow a work plan comprising three major stages: (1) a preparatory stage to survey current work and to collect needed documentation. (2) A second stage to develop a unified methodology, while deriving examples and documentation for the users. (3) A third stage to collect feedback, disseminate the work done and finalize the documentation for easy adoption of the guide.

## Scope, major aims of the STF work

The objective of the requested funded activities is to drive the work towards a fast delivery of an ETSI Guide for REST API specification and testing.

The availability of the ETSI Guide is an essential foundation for an efficient, future proof and reliable standardization of RESTful APIs in all sectors of ICT domain.

The main goals of the STF was set to ensure the following quality criteria for the target deliverable (EG 203 647):

* A coordinated and homogeneous collection of current REST API specification activities and of the documentation produced in the individual groups, considering specifically guidelines, conventions and patterns that already exist in these groups,
* A unified approach delivered in time to support upcoming activities, and
* Dissemination and validation efforts towards ETSI TBs and ISGs to educate, collect feedback on the proposal to enable planning eventual improvements.

## STF activity and expected output

The STF has been working remotely and F2F (until possible, due to travel restrictions following the Covid19 outbreak) with recurrent coordination meetings and autonomous work.

The development of the Guide has followed the best practices and complied with ETSI Drafting rules. To ensure the relevancy and effectiveness of the work, a thorough research has been conducted on the broad topic that was the subject of the Guide.

A survey has been conducted in the ETSI Groups to spread the awareness on the ongoing work, giving the possibility to feed input and discussion items.

No changes have been applied from the original objectives and the entirety of the expected output has been delivered. Indeed, given the subject of RESTful APIs, further improvements to the Guide could be developed and could result in normative work. As requested in the Terms of Reference, the work of the STF aimed at being inclusive with all experiences and practices already in place in ETSI TBs and Groups, allowing to tailor the methodology to the specific needs of each of them.

## Relation with the reference TB and with other bodies, inside and outside ETSI

* LSs have been sent to relevant ETSI groups
* LSs have been received from ISG NFV, ISG QKD and OSG OSM

# Overview of the organization of the activity

## Team composition and experts’ qualification

Members of the team (in alphabetical order) and respective affiliations:

* Martti Käärik, OÜ Elvior
* Michele Carignani, ETSI,
* Philip Makedonski, Institut für Informatik, Universität Göttingen,
* Sana Zulfiqar, xFlow Research Inc.

## STF teamwork, distribution of tasks, working methods

The development of the guide has been a collaborative effort, where individual contributions were reviewed, discussed and improved in collective meetings.

For the first phase of the STF, the activity of survey and analysis of base documents was assigned to University of Goettingen and xFlow Research.

For the development of the guide, different sections of the guide where under the responsibility of individual members of the team. Each team member, developed its part (in continuous exchange with the rest of the team).

The organizational and management tasks where assigned to the STF Leader, including organization of meetings, communication to external bodies, note-taking.

During the 2 organized F2F working sessions, the experts collectively reviewed the work while planning and outlining the next activities in the workplan.

## Liaison with the reference TB and/or the Steering Group

Recurrent online meetings has been organized between October 2019 (start of work) and March 2020. After the second F2F, as the team focussed on T4 and T5, weekly meetings have been organized online. The weekly meeting has been ongoing until July 2020.

Participation to TC MTS plenaries has been ensured by all team members for the two meetings MTS #79 and MTS #80. Participation in MTS #81 is also planned.

## Meetings attended on behalf of the STF with the reference TB and other ETSI TBs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Date** | **Place** | **TB/Orga** | **Event description** | **Reason to attend** | **Expert(s)** |
| 14/11/2019 | Sophia Antipolis, FR | ISG MEC | MEC #20 Plenary | Introduce the work and EG 203647 | All |
| 28/01/2020 | Sophia Antipolis, FR | TC MTS | Plenary Meeting #79 | Report and approval on Milestone A | All  |
| 12/05/2020 | Remote | TC MTS  | MTS Plenary #80 | Milestone B approval | All |
| 07/09/2020 | Remote | OSG OSM  | OSM #10 Plenary  | Disseminate the results of the Work | Sana Zulfiqar |
| TBD | Remote | ISG ZSM | ZSM meeting | Disseminate the results of the Work | Martti Kaarik |
| 14/09/2020 | Remote | NFV#31-Remote | NFV Plenary | Disseminate the results of the Work | Philip Makedonski |
| TBD | Remote | SmartM2M#55 | SmartM2M Plenary | Disseminate the results of the Work | Sana Zulfiqar |
| 22/09/2020 | Remote | ISG MEC | MEC #23 Plenary | Disseminate the results of the Work | Michele Carignani |
| TBD | Remote | ISG PDL | PDL remote meeting | Disseminate the results of the Work | Michele Carignani |
| TBD | Remote | ISG CIM | TBD | Disseminate the results of the Work | Martti Kaarik |

## STF communications, presentations, promotion, inside and outside ETSI, WEB pages etc

A significant number of communication initiative have been put in execution or planned by STF 576, given the importance of collaboration with the different stakeholder, with a particular focus on ETSI groups:

1. The STF Website public website has been made available at the following URL:
	* <https://portal.etsi.org/STF/STFs/STF-HomePages/STF576>
2. A presentation to introduce the team and the scope of work has been brought to ISG MEC during the Plenary meeting #20. The presentation is contributed as document number MECDECODE(19)000078 and is available at the following URL:
	* [https://docbox.etsi.org/ISG/MEC/DECODE/05-CONTRIBUTIONS/2019//MECDECODE(19)000078\_STF\_576\_-\_Survey\_and\_guidance\_on\_RESTful\_API.pptx](https://docbox.etsi.org/ISG/MEC/DECODE/05-CONTRIBUTIONS/2019//MECDECODE%2819%29000078_STF_576_-_Survey_and_guidance_on_RESTful_API.pptx)
3. A Survey has been published and communicated on 17/12/2019 (with a reminder sent on 13/01/2020) to the following groups:
	* ISG MEC
	* ISG NFV
	* 3GPP CT and SA groups
	* OneM2M and ETSI TC SmartM2M
	* TC MTS,
	* ISG CIM,
	* ISG ZSM,
	* OSG OSM.
4. The Survey has been made available through the SurveyMonkey service provided by ETSI at the following URL:
	* <https://www.surveymonkey.com/r/5X3NRTW>
5. The results of the survey have been presented through the means of an open Webinar, the details of which have been communicated to groups and individuals who took part in the survey. The webinar has been made available through the GotoWebinar service provided by ETSI at the following URL:
	* <https://attendee.gotowebinar.com/register/8895577238385756685>
6. A public documentation portal and collaborative wiki on RESTful activities in ETSI will be developed (tentatively at rest.etsi.org), pending approval from TC MTS;
7. Participation in other ETSI meetings is foreseen;
8. Publications as scientific papers or articles will potentially be developed;
9. Publication of the contents of the working area of the STF on the ETSI Forge, available at <https://forge.etsi.org/rep/mts/eg-203647-restful-api-guide>.

# Final status of the activity

## Overview of the STF work

All objectives for the Tasks envisioned in the workplan for STF 576 has been successfully completed.

* Summary of the deliverable, common terminology, normative and informative references, as targeted in Task T1, has been made available as part of Milestone A. A complete collection and categorization of relevant topics has been outlined and included in the planning for the next tasks.
* Knowledge based of standardization activities for REST APIs has been created during phase 1, according to the objectives of Task T2. The list of base documents has been reviewed and enriched. Detailed reports for the individual document have been provided in a structured manner and a public online survey has been organized and communicated among relevant ETSI TBs and Groups.
* Clause of the target deliverable to document and report the current activities and the main requirements they address or signal, has been developed in Clause 8 of the target deliverable, in accordance with Task T3.
* The documentation of a methodology for the complete lifecycle of REST API specification and testing is outlined in EG 203 647 as per Task T4. The methodology is rooted in best practices as well as normative specification in force.
* An end-to-end set example of a REST API specification and test specifications developed, using the methodology proposed in task 5, applied to the tools and languages developed by TC MTS and ETSI has been delivered. The examples include: OpenAPI examples, TD and TDL-TO examples for Test Purposes and Descriptions, TTCN-3 and Robot Framework examples for Test Cases. For TDL Test Descriptions and TTCN-3 test cases, both a manual and an automatically generated versions are available to emphasize the possibility for automation.
* Publication of publicly available web page to introduce and explain the methodology is planned and available for review of TC MTS.
* Participation of at least 2 ETSI/PP meetings to present the outcome of the work will be ensured within the execution of Task T6.

## Technical risk, difficulties encountered and corrective actions taken

Within previous progress report, a main risk has been identified in the importance of engagement and effective exchange with relevant standardization groups at ETSI, for the successful adoption of EG 203 647 in standardization practices.

The mitigation actions set in place to prevent the risk of low engagement and exchange include the communication activities, preparation of Liaison Statements and dissemination activity.

Unexpected difficulties has been caused by global travelling and working restrictions following the epidemic virus outbreak. This has resulted in the cancellation of many possible speaking opportunities as well as the modification of ETSI TB meetings in full-remote set up. The travelling restrictions has not prevented the possibility to hold the second F2F in March 2020, which was crucial in the work development.

## Lessons learnt

NA

## Recommendations for future activities in related domains

NA

# ETSI deliverables

|  |  |
| --- | --- |
| Deliverable: DEG/MTS-203647/ EG 203 647Current status: Draft receipt by ETSI SecretariatMethods for Testing and Specifications (MTS) Methodology for RESTful APIs specifications and testing | **Achieved date** |
| Creation of WI by WG/TB | 2018-09-27 |
| TB adoption of WI | 2018-09-27 |
| Start of work | 2019-07-25 |
| Early draft | 2020-01-27 |
| Stable draft | 2020-05-08 |
| Final draft for approval | 2020-07-29 |
| TB approval | 2020-08-28 |
| Draft receipt by ETSI Secretariat | 2020-08-31 |
| Publication | Expected 2020-11-27 |

1. Performance indicators
	1. Performance Indicators objectives achieved

**Quality of the deliverable:**

* + Approval of deliverables from the Reference TB according to schedule: Achieved with minor delay.
	+ Deliverables approved by TC MTS accepted by the ETSI Secretariat for publication: Achieved.
	+ Respect of time scale, with reference to start/end dates in the approved ToR: Achieved with minor delay.
	1. Performance Indicators objectives not achieved

NA.

1. Resources allocated and spent

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author:**  | **ETSI - Funded Activities** |  |  |  |  |
| **Period covered:** | **From: 30/09/2019** | **To: 30/06/2020** |  |  |  |
| **Status:**  | **Final** |  |  |  |  |
| **Status date:**  | **02/06/2020** |  |  |  |  |

* 1. Summary of resources allocated and spent (real cost)

|  |
| --- |
|  The resources allocated though the ETSI FWP was 78 000,00 € in total. |

These have been divided into Manpower and travel budgets. The total expenses are summarized in the table below.

Table 1: Summary of resources spent

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   |   | **Expertise Service Provision** | **Travel** | **Total** |
| Resource Available | 66 000,00€ | 12 000,00€ | 78 000,00€ |
| Resource Usage |  66 000,00€  | 4 836,97€ | 70 836,97€ |
| **Variance (Avail. - Usage)** | 0,00€ | 7 163,03€ | **7 163,03€** |

This table provides a detailed view on the travels of the STF.

Table 2: Travels

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Expert Name** | **Event** | **Place** | **Date From** | **Date To** | **Cost (EUR)** |
| Martti Käärik | STF 576 session 1 | Sophia Antipolis | 11/11/2019 | 15/11/2019 | 809,14 |
| Ashok Malani | STF576 Working Session | Sophia Antipolis | 11/11/2019 | 15/11/2019 | 1657,10 |
| Philip Makedonski | STF Working Session 1 | Sophia-Antipolis | 11/11/2019 | 15/11/2019 | 925,39 |
| Martti Käärik | MTS plenary #79 | Sophia-Antipolis | 28/01/2020 | 29/01/2020 | 447,54 |
| Martti Käärik | STF576 working session | Göttingen | 02/03/2020 | 05/03/2020 | 997,80 |

|  |
| --- |
| **Total Travels: 4 836,97 €.** |