

SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

The STSM applicant submits this report for approval to the STSM coordinator

Action number: CA15127

STSM title: Assurance of communication resilience under disaster-induced failures

STSM start and end date: 02/07/2018 to 07/07/2018

Grantee name: Jacek Rak

PURPOSE OF THE STSM/

The objective of this STSM was to analyze solutions to the problem of assuring communication resilience in the presence of multiple failures following from natural disasters as well as weather-based disruptions described by the Members of the Action in their draft versions of chapters of the final book of the Action (including about 35% of the final content of the chapters). In particular, this STSM was focused on:

- (a) analysis of contributions to chapters addressing the aims of Working Groups 1 and 2,
- (b) preparation of reports to give advice to authors concerning the further development of chapters.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

This STSM was planned to enable the STSM participant (Action Chair) and STSM host (WG1 Leader) to verify the draft versions of chapters of the Action final book prepared by the Action Members addressing the objectives of Working Groups 1 and 2. Evaluation reports were prepared, accordingly, to be next given to the respective authors.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

(max. 500 words)

The main result of this STSM is the report attachment

CA15127_STSM_41541_report_attachment.doc presented below including the evaluation remarks made to the analyzed chapters by STSM Participant and STSM host during this STSM.

FUTURE COLLABORATIONS (if applicable)

(max.500 words)

Further joint activities in the context of analysis of next contributions of the Action Members to the chapters of the Action final book are planned. Also, plans include the preparation of specific joint chapters of the final book of the Action.

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CA15127_STSM_41541

Remarks on draft versions of chapters (about 35% of the final content) of the final book of CA15127-RECODIS addressing the objectives of Working Groups 1 and 2

July 30, 2018

RECODIS book

Remarks on draft chapters

Chapter 1.1 *Definition of Metrics of Network Topologies to Measure Resilience of Carrier Networks*

The draft version of this chapter contains 28 pages.

It is currently not compliant with the Springer template for monographs.

Definitions concerning dependability (Section 0.3) are planned to be provided in the introductory chapter of the book. In the current content of Section 0.3, only availability and reliability are measures, while other terms are disciplines of resilience. You should mention these in the introductory part of this chapter (section 0.2)

The abbreviation NSGC should be introduced in the text, and not only in Table 2.

Because measures presented in this chapter are important not only for the scenario of attacks, sections 0.1-0.4 should perhaps form a separate chapter.

Also, because of this, it might be better to propose a separate chapter on attack vulnerability analysis (content currently in Section 0.5). As Section 0.5 uses measures of resilience, their definitions might be referenced to the chapter where they are defined, with illustrative examples in the book.

Chapter 1.4 *Algorithmic approaches to enumerate vulnerable regions of network topologies*

Please consider how you might revise the chapter to become a bit more tutorial-like with examples (with Figures showing results for simple cases), and less like a conference paper mainly focused on formal statements, observations, and definitions.

The title of the chapter could be revised to include information on types of disasters considered (natural disaster or attacks). Is the chapter on region failures or on effects of malicious activities but not necessarily restricted to a certain region?

Given that the chapter might be revised to be more of a tutorial, the state of the art section is thus not as important as in a normal conference paper, and should perhaps be reduced. The chapter should inform network and other operators how to use these approaches in the design and evaluation of network architectures. Illustrative examples are therefore desirable.

Chapter 2.3 *Post-disaster recovery and emergency networks*

The Action is meant to provide a set of solutions that are important to network and other operators. It is not aimed at designing new end-user applications/services, but rather to assure communication capabilities of a network (owned by an operator) to better support applications and/or services in a disaster scenario.

Therefore, the major focus of the chapter (as a guide for network operators) should be on the design/update/recovery of a communication network (i.e. a structure owned by an operator). This will

include its ability to serve demands in a post-disaster period between a disaster and the time until full physical repair (e.g. in the case when part of the network remains operational).

So it is important to identify what kind of services are demanded by people most in the post-disaster scenario (for sure eHealth is not the only one; others would include video and/or voice transmission). The focus should not be on the design of these services themselves, but on QoS parameters and relevant network support required by these services. It is most important to decide how to proceed with fast recovery of the operator's network to be able to serve the most critical services, and to make the network infrastructure as useful as possible for end-users in the post-disaster period.

For instance, in the case when network links become affected by falling water after a volcano eruption (while the nodes remain unaffected), what techniques can be applied (e.g. based on wireless communications) to connect the unaffected nodes in the network's architecture and to achieve at least a partially performant network.

Chapter 2.6 *Quality role in wireless communications under weather-based disruptions*

"Quality Role" in the title of the Chapter is not precise; it probably needs to be re-phrased. Section I includes some content that is more appropriate for the introductory Chapter of the first part of the book; other parts of the chapter should make reference to that part of the book. The section "Vulnerability of Wireless Communications over Different Weather Conditions" is surely the introduction to the chapter.

Chapter 2.12 *Alert-based network reconfiguration and data evacuation*

This chapter is relevant to all other working groups, and not just to WG2.

Chapter 3.0 *Basic approaches to calculate disjoint paths*

The planned content is appropriate. However, special care should be taken to unify symbols, the definition of a network graph, and other relevant terms before their first use. Please note also that it is not appropriate to define the network graph several times in the course of the Chapter.

Chapter 3.2 *Algorithms of resilient routing (and routing metrics) to assure resilience of communication paths to natural disasters*

The title of the chapter should surely be updated to include "region failures" as the Chapter deals with this topic.

The height and width of all figures should be unified.

Chapter 3.7 *Enhancing availability for critical services*

The introduction section should mention other related approaches, as well as providing motivation and a brief summary of the approaches described later in the chapter.

Chapter 3.11 *Resilience of Free Space Optical (FSO) communications*

The chapter should be more focused on presenting illustrative examples to make the content easier to read.

Perhaps the content is more relevant to part 2 of the book (on design).