NEWSLETTER | Issue n° 1 | May 2015

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EDITORIAL

It is with great pleasure that I introduce you to this first edition of the GAMMA Newsletter.

The goal of the GAMMA project is the development of solutions to the emerging ATM vulnerabilities with practical proposals for implementation, also considering the new scenarios defined by the Single European Sky programme.

This newsletter comes at a crucial stage for the GAMMA project, as results from the first 18 months of work are emerging, while the ground is being laid for the next stage of the project, which will see the development of prototypes leading up to the validation of the solutions proposed by GAMMA.

In this edition, you will have the opportunity to read about the GAMMA vision for ATM Security in an article setting out the framework for collaborative management of ATM security in Europe. This article provides an insight into the principles inspiring the GAMMA vision, highlighting the importance of setting the proposals emerging from GAMMA into a relevant institutional environment.

The institutional theme is developed further in a separate article exploring the results of a study on civil military cooperation issues, which represent a vital part of the institutional framework within which the GAMMA solution is supposed to operate. GAMMA has benefitted from solid links with SESAR from which it has derived the tools and methodologies ensuring the alignment of activities while avoiding duplications.

The Newsletter is intended to provide regular updates and insights into the results and achievements delivered by GAMMA, establishing a communication link towards the community of stakeholders with an interest in ATM security.

I hope this Newsletter will stimulate your interest in GAMMA.

by **Giuliano D' Auria,**
GAMMA Project Coordinator

GAMMA IN BRIEF

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DURATION:	48 months
BUDGET:	14.8 € Million

NEWS

GAMMA completes ATM Security Risk assessment activities

GAMMA laid the foundation for the development of a solution for ATM Security, by completing the work on Security Risk assessment. The major risks targeting the ATM system have been identified and recommendations have been proposed for ATM risk reduction, retention, avoidance or transfer (of residual risks). The objective is to reduce security risks by defining security controls.

GAMMA presented to NEASCOG

The GAMMA project was presented to NEASCOG, the NATO/EUROCONTROL ATM Security Coordinating Group and focal point for ATM Security in Europe, covering both civil and military interests. NEASCOG acts as a forum for all national and international stakeholders that have a role to play with respect to airspace and ATM Security in Europe.

GAMMA First User Workshop

The first GAMMA User Workshop was organised in Rome, at the Selex ES premises. The meeting provided the opportunity to meet relevant stakeholders and to present the work carried out within GAMMA in the first year of the Project.

ARTICLES

GAMMA CONOPS
The Ultimate ATM Security Framework

Principles and Background for the GAMMA Solution

The ATM Security solution proposed by GAMMA builds on the principles and concepts related to Security Management in a collaborative multi stakeholder environment, while maintaining a strong link to the current international and European legal framework and the constraints given by the respect of national sovereignty.
Security is a national responsibility which cannot be delegated. This principle has been highlighted in ICAO Annex 17 as well as in the Implementing Rule 1035/2011 of the Single European Sky legislation, which recognises the role of the State in security governance, requiring the implementation of a security management system and the establishment of a first level of coordination to discharge the institutional responsibility for national security.

The GAMMA solution has been defined and developed with these principles in mind and aims at facilitating and enhancing the implementation of a Security Management system by extending the scope of collaborative support beyond the local level.
The GAMMA vision recognises the opportunities opened by a collaborative framework for managing security, building a solution based on the self-protection and resilience of the ATM system with an immediate relevance to the real security challenges facing the existing ATM environment and its evolution foreseen in SESAR.
The proposal emerges from a detailed assessment of ATM security threat scenarios carried out in full compliance with SESAR methodologies and building on its results. The solution outlined here should therefore be seen as complementing the work performed in SESAR, with a concrete proposal for the operational use of innovative technological systems establishing an ATM security function as an additional service in the Air Navigation System.

GAMMA Solution

The operational and technical scope of the GAMMA vision is given by the existing ATM system and its evolution foreseen within SESAR. The GAMMA solution can be conceptualised as a network of distributed nodes embedded within the ATM system and providing interfaces to (ATM) internal and external security stakeholders.
GAMMA establishes three different levels for managing security:

- the **European level**, represented by the European GAMMA Coordination Centre (EGCC),
- the **National level**, represented by the National GAMMA Security Management Platform (NGSMP)
- **the Local level**, represented by local security systems as well as Local GAMMA Security Operation Centers (LGSOC).

Two different human roles are considered within the GAMMA concept:

- **GAMMA Operators**, represented by actors performing functions within the LGSOC, NGSMP and EGCC.
- **GAMMA Users**, represented by Users of the local security systems.

The GAMMA solution is designed for seamless adaption and integration into the local ATM systems. For this reason, the **Local level** is represented by two types of solutions:

- **Local security systems** embedded in the current or future ATM systems (and/or procedures) that address security aspects operating independently from the LGSOC.
- **A specific GAMMA system** (LGSOC) with access to the information defined within GAMMA to support the local security activities.

When introducing the GAMMA solution into the ATM environment the local security systems may provide security information to the LGSOC or directly to the NGSOC (for example, alerts, monitoring of supporting assets, monitoring of security controls or countermeasures).
The LGSOC is an information sharing platform introduced into the ATM environment by the GAMMA solution, with the aim of collecting and processing security information from local security systems, as well as receiving and providing information from the National and European levels. The LGSOC therefore provides a local GAMMA operator with a window towards the information elaborated by GAMMA at National and European levels through an extended collaboration platform. The GAMMA architecture is open to local implementations and the existence of LGSOC is not mandatory as local security systems could be interconnected or linked directly to the NGSMP.

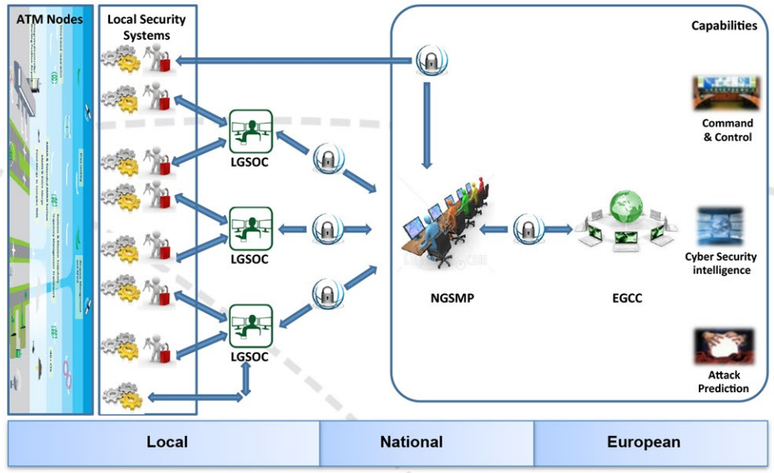
The **National level** has the capability of processing and analysing the information received from the Local level through the operation of an information sharing platform (NGSMP) allowing the detection and prediction of attacks as well as proposing the corresponding alerts, actions or countermeasures and predicting corresponding impacts.

The opportunities made possible by the establishment of a cooperative environment highlight the need for an appropriate 'sanitisation of information' in order to encourage the exchange of information within the legal limits set by the regulatory framework. Sanitisation should be seen a prerequisite for the successful exploitation of collaborative environments within the existing regulatory framework.

Sanitisation of the information aims to categorize the sensitive information, generated at local and national level that can be disseminated at European level, if necessary opportunely modified so as to eliminate sensitive aspects. In the picture below, the padlock system represents where the sanitization process can be performed.

The **European level** (EGCC) enriches the opportunely sanitized information derived from the National level extending the cooperation platform through the operation of Cyber Intelligence functionalities in order to discover possible external threats related not only to the ATM environment but also to other services/systems whose disruption or destruction could cause domino effects on ATM. The EGCC is then responsible for feeding such information to the NGSMP for further disseminating to the Local level.

The GAMMA solution therefore opens the way for the European level to propose (but not enforce) recommendations on actions or measures to be taken at lower levels, in line with existing principles of national sovereignty and responsibilities over security issues. The GAMMA architectural vision enlarges the scope for cooperative management of ATM security while remaining rooted in the fundamental principle that Security cannot be outsourced or delegated.
The GAMMA Solution has been conceived as a concrete and easily deployable proposal for the management of ATM security, exploiting innovative technologies and procedures while maintaining compatibility with the European ATM framework defined in the Single European Sky.



ARTICLES

Civil-Military Cooperation Issues

GAMMA conducts a thorough assessment of the ATM Security framework with the aim of identifying the institutional environment within which the GAMMA proposed solution is intended to operate so as to allow for its smooth adaptation and integration into this environment. As part of this study, all aspects of cooperation and coordination between the civil and the military for ATM Security purposes are considered, including governance, organisation, procedures, regulations, technologies, joint civil-military training and exercises related to incident/crisis management.

As defined in ICAO Cir 330 AN/189, EC Regulation N° 1035/2011 and EUROCONTROL Manual for National ATM Security Oversight, the military are involved in ATM security in two ways:

- **self-protection of the ATM system**, providing necessary support on request of civil aviation authorities and ANSP or Airports Operators for the protection of their facilities (normally in case of raised security alert levels);
- **collaborative support**, defining the information and support requirements needed from ANSPs, Aircraft Operators and Airport Operators, for air defence, contingency and incident management situations.

As part of the GAMMA study into these issues, the following approach has been followed:

- **the *as-is* (current) situation** of the civil-military cooperation in ATM security has been established through questionnaire replies from military organisations of different European countries and subsequent meetings with these organisations;
- from this *as-is* situation, a **set of best practices** has been identified;
- and a list of **improvements** is proposed to enhance the civil-military cooperation in ATM Security.

Two major types of threats are considered:

- **Airborne threats**, covering situations of airspace security incidents, including hijacking and renegade situations, where the military have a leading role in the incident's resolution, with the support of ATM. Scenarios using drones (RPAS) are also included.
- **Technological threats**, where ATM systems or assets are targeted and the military play a role first by self-protecting their own systems connected to ATM systems and in some cases by providing air navigation services (contingency planning) or performing post-incident analysis. The military also play a growing role in the threat assessment phase regarding cyber-security.

The improvements identified by GAMMA in this study are of different nature and cover different horizon timeframes.
Among the improvements of technological nature, one can note the following ones:

- Use of SESAR Dynamic Mobile Areas (DMAs) for airspace security purposes.
- Use of existing Safety Nets for Security Nets.
- Exchange of ATM incident-related information between civil and military via data link.
- Use of future Global Aeronautical Distress & Safety System (GADSS) for airspace security purposes allowing early warning of airspace security incidents (this improvement could be coupled in the longer term with aircraft passivation).

Among the improvements of operational or organisational nature, one can note the following ones:

- Harmonisation of ASSIM (Airspace Security Management) Implementation between nations.
- Upgrade of agreements between neighbouring National Governmental Authorities to better handle cross-border situations.
- Full involvement of the military in the definition and update of the ATM Security Policy.

Regarding the training aspects the following improvements are suggested:

- Joint Civil/Military Training exercises on technological and airborne threats based on distributed simulator platforms
- Introduction of new types of training exercises on cross-border airspace security incidents, such as the case of a business aircraft hidden behind a commercial aircraft.

GAMMA PROGRESS

GAMMA Project's Activities

GAMMA's current activities aim to define a global and comprehensive approach to design the architecture of a security solution addressing security management in the ATM environment.
This approach intends to propose a holistic view of the ATM environment considering it a system of systems. Nevertheless, due to limitations of resources and effort, some boundaries have been established, narrowing the assessment of the ATM systems to those considered more vulnerable after the security risk and treatment assessments already performed within the GAMMA project.

Further to these considerations, other project outcomes have been taken into account in the development of the architecture design activities: the high level vision of the GAMMA concept of operations, including inputs coming from the analysis of the regulatory framework, the roles and responsibilities of actors and the civil-military coordination.

The results produced by GAMMA are hence the list of **ATM Security Requirements** and the **ATM Solution architecture model**. This latter was progressively developed in two stages, resulting in two versions of the architecture, the second completing the first and corresponding to the full ATM security architecture.

The **ATM Security Requirements** aim to satisfy the security objectives defined for the European ATM system. These requirements are used to develop the specification of the global GAMMA solution, embracing all foreseen ATM systems covering their entire threat cycle, spanning from prevention to the management of consequences resulting from security incidents.

The requirements are defined following a methodology going through different iterations until reaching the level of granularity and the detail required for their use as an input to the GAMMA activities mainly related to validation and prototypes development.

The **ATM Solution Architecture model** has been developed consistently with SESAR MBSE (Model-Based System Engineering) approach. The Operational and System Architectures of the ATM Security solution are described by the Enterprise Architecture views of the NATO Architecture Framework (NAF). The ATM Solution Architecture model describes the **global** architecture of the ATM security solution, addressing all security controls identified by GAMMA.

This architecture is therefore not limited to the security systems that will be the object of further validation in

GAMMA Project's Activities
(cont.)

the GAMMA project (via the security prototypes and the associated validation platform). Nevertheless, the prototypes that have been proposed in the GAMMA project are taken into account in the system architecture as the main elements of the proposed ATM security system.

The main features described in the ATM Solution Architecture include: the **Modelling approach** which explains the architecture objectives and the methodology used to develop it, the **Modelling of Threat Scenarios** to identify the operational nodes and actors involved, their responsibilities and interactions, and the **Operational and System views** of the architecture which, respectively, describe the new or updated operational processes together with their operational nodes and the ATM security system breakdown structure and the system functions breakdown structure.

Furthermore, a **dynamic view of the most relevant system functions**, the **high level operational concepts view** and the **mapping of the GAMMA architecture with SESAR architecture elements** have also be defined.

The consistency between the outcomes of these last activities within the GAMMA project, involving requirements and architecture, has been ensured through the mapping between requirements and operational processes and architecture elements included within the final version of the ATM Solution Architecture.

GAMMA proposes a holistic view of the ATM environment.

DISSEMINATION

PUBLICATIONS

The Social Acceptance of the Passivation of Misused Aircraft
by Ana P. G. Martins
presented at the 9th International Conference on Availability, Reliability and Security on September 2014.

Hyperarticulation in Lombard speech: a preliminary study
by Juraj Smiko, Stefan Benus and Martti Vainio,
presented at the Speech Prosody 2014 on May 2014.

GAMMA - Filling the security management void of SESAR and NextGen
by Rainer Koelle, Garik Markarian and Denis Kolev,
presented at the 2014 Integrated Communications, Navigation and Surveillance Conference on April 2014

EVENTS

GAMMA at the NEASCOG ATM Security Conference
June 9-10, 2015 - Brussels, Belgium

GAMMA will present the results of its work as part of the exhibition organised by the conference. Special emphasis will be given to the presentation of the concept of operation and the study on civil military cooperation which is expected to be of special interest for the NEASCOG military audience. GAMMA will display at its stand a demonstration of the Attack Effect Prediction module, developed as part of the GAMMA Security Management platform prototype. This module is a software solution, which by collecting various security incidents, is capable of:

- detecting possible ongoing threats;
- providing a prediction of possible actions of the adversary;
- estimating actual resources of the adversary.

We hope to see you at the GAMMA stand!

NETWORKING

GAMMA joins EUROCAE Working Group 72

GAMMA is pleased to announce its membership of ACARE working group 72.
By officially joining the EUROCAE organization GAMMA is positioning itself as a key player in the definition of standards aimed at providing concrete solutions to the security challenges facing ATM.
GAMMA will contribute to Eurocae WG 72 by building on the knowledge gained through the work performed on risk assessment and the definition of a proposed solution for managing security in the European ATM environment.

FUNDING OPPORTUNITIES

H2020-SESAR-2015-1
Deadline 25/06/2015
The SESAR Joint Undertaking ("SJU") is henceforth responsible for "carrying out specific activities aimed at modernising the European air traffic management system by coordinating and concentrating all relevant research and development efforts in the Community". The 2015 call for proposals concerns research topics in the context of ATM that will address the Research & Innovation needs for: a Resource-efficient transport system that respects the environment; better mobility, less congestion whilst ensuring safety and security; a Global leadership of European transport industry; a Socio-economic and behavioural research and forward looking activities for policy making.
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-sesar-2015-1.html

H2020-FTI Pilot-2015-1 Fast Track to Innovation Pilot
Deadline 01/12/2015
The FTI pilot aims to reduce the time from idea to market and increase the participation in H2020 of industry, SMEs and first-time industry applicants. It should stimulate private sector investment, promote research and innovation with a focus on value creation, and accelerate the development of innovative products, processes and services.
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-ftipilot-2015-1.html

GAMMA
GLOBAL ATM SECURITY MANAGEMENT

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