CGMS-52-WGI-WP-07
25 March 2025

Prepared by: NOAA
Agenda Item 7.1
Discussed at WG1

Subject	***Report from the CGMS WGI Task Group on RFI detection, monitoring, and mapping (incl. latest ToR, status on current & proposed/planned activities)***
In response to CGMS action/recommendation	WGI/A51.04, WGI/A51.05
HLPP reference	2.2 Radio Frequency (RF) protection
Executive Summary	Working Group I tasked the TGRFI (Task Group on RFI detection, monitoring and mapping) to continue pursuing the establishment of a proposed set of best practices for CGMS-53 based on the common aspects of the approaches already adopted by members and to explore the potential / existing uses of AI/ML and pattern recognition in RFI detection. This paper outlines the Task Group status, describes its activities in the past year and the plans for the coming period.
Action/Recommendation proposed	Recommendation: Working Group I to instruct TGRFI to continue with a proposed set of best practices by CGMS-53 WGI, completing the publication of the passive remote sensing best practices and focusing on communication RFI (e.g. DCS) based on the common approaches already or planned for adoption by members for endorsement by CGMS-54. Also, to further explore the potential / existing uses of AI/ML and pattern recognition in RFI detection based on development and practices being implemented by member organizations.

1 INTRODUCTION

The Task Group on RFI Detection, Monitoring and Mapping (TGRFI) was established in response to CGMS-49 request to establish the initial ideas about mechanisms regarding the detection, monitoring, and mapping of RFI, including the passive bands. The group began meeting in May 2022 and has continued meeting periodically since that original kick off.

This paper briefly summarizes the status of TGRFI, its activities to date, and its planned upcoming activities.

2 CURRENT STATUS

1.1 Membership

The current membership of the TGRFI, including guests, is listed:

Organization	Name	
CMA	NIE	Jing
CMA	WU	Shengli
ECCC	Alec	Casey
ESA	Yan	Soldo
EUMETSAT	Markus	Dreis
EUMETSAT	Simon	Elliott
EUMETSAT	Karolina	Nikolova
KMA	Dohyeung	Kim
NOAA	Beau	Backus
NOAA	Skip	Dronen
WMO	Jesse	Andries
Guest	Phillippe	Tristant

1.2 Terms of Reference

The tasks of the TGRFI team for this year include:

- Analyze the inputs provided by CMA, EUMETSAT, KMA, and NOAA on spectrum concerns and activities on RFI detection, monitoring, and mapping and…
- Continue to pursue the establishment of a proposed set of best practices by CGMS-53 based on the common aspects of the approaches already adopted by members.
- Continue to explore the potential / existing uses of AI/ML and pattern recognition in RFI detection.

Beau Backus from NOAA continued to lead TGRFI.

1.3 Current and Upcoming Activities

1.1.1 TGRFI Intersessional #1 (22 Oct 2024)

Review of team members and discussion on any additional members recommended to be invited. Discussion on the documentation built from the inputs provided by CMA, EUMETSAT, KMA, and NOAA regarding RF spectrum interference concerns and activities on RFI detection, monitoring, and mapping. Continued discussion on development of a draft set of best practices for CGMS-53 based on aspects of the approaches already adopted by members. Determined that the current draft best practice was focused primarily on remote passive sensing RFI and that the best practices for RFI needed to be a set focusing on different aspects of use of the Electro-Magnetic Spectrum. Reviewed an AI generated document on the potential or existing uses of AI/ML and pattern recognition for RFI detection. Group agreed to place more focus on this action item. Markus Dreis highlighted that uses of AI/ML may be relevant for RFI management in view of large satellite constellations.

1.1.2 TGRFI Intersessional #2 (13 Nov 2024)

Members briefly reviewed roster of team members. Most of the meeting spent in review and discussion of the “[Draft] CGMS Agency Best Practices for RFI Detection, Monitoring, and Mapping” document. Members provided updated material to be discussed in the document. Identified that machine learning capabilities should, in additional to member review, also be included in the RFI Best Practices document. Next intersessional planned for 09 January.

1.1.3 TGRFI Intersessional #3 (10 Jan 2025)

Meeting postponed for one day due to declared non-working day in USA. Members continued to review and discuss the updated version of the “Best Practice Brainstorming for RFI Detection, Monitoring, and Mapping” document – further

development of document summary and scope towards remote passive band RFI. It was determined that an additional meeting may be needed prior to the CGMS-53 WGI meeting. The fourth meeting is scheduled for 5 February. Team discussed the AI/ML document and provided comments.

1.1.4 TGRFI Intersessional #4 (5 Feb 2025)

Members continued to explore and comment on the uses of AI/ML and pattern recognition for RFI detection in the "CGMS Agency future and existing uses of AI, ML and pattern recognition in RFI" document. The team reiterated that AI/ML is a rapidly growing technical area and that members should continue to review their agencies activities in this area for application to RFI identification and mitigation.

Comments also captured in the "Best Practice Brainstorming for RFI Detection, Monitoring, and Mapping" document. Refined and merged the comments made in the document. Determined that the document needed additional work but would be ready for endorsement at CGMS-53. It was realized that the use of Google Meet for the Intersessional meetings was not available to all members, so the meetings were moved to Zoom for all future meetings. Members determined that additional time was needed for developing the Best Practice document and agreed to meeting again on 10 February.

1.1.5 TGRFI Intersessional #5 (10 Feb 2025)

Members briefly reviewed and commented on the final version of "CGMS Agency future and existing uses of AI, ML and pattern recognition in RFI" document. The team discussed the next cycle (CGMS 54) TGRFI suggested action: "Request and analyze inputs provided by CMA, EUMETSAT, KMA, NASA, and NOAA on AI development projects that are applicable to RFI detection and mitigation. Identify RFI detection and mitigation related AI projects that may overlap between organizations or require cognizance between organizations."

The team completed reviewing and refining the newly renamed "CGMS Agency Best Practices for RFI Detection, Monitoring, and Mapping for Remote Passive Sensors" document for endorsement by WG-I. Discussed next cycle (CGMS 54) TGRFI suggested action: "Request and analyze inputs provided by CMA, EUMETSAT, KMA, NASA, and NOAA on spectrum concerns and activities regarding RFI detection, monitoring and mapping, and pursue the establishment of a set of best practices for data communications (i.e. DCS), based on the common aspects of the approaches already adopted by members." If the suggested action items are agreed to, members plan to meet again on 29 July 2025 to start work.

1.4 Upcoming Activities

The Task Group's next requested tasks are to complete a draft proposed set of best practices for data communications (e.g. DCS) RFI by CGMS-54 based on the common

aspects of the approaches already or planned for adoption by members for endorsement by CGMS-54. Additionally, the Task Group will identify RFI detection and mitigation related AI projects that may overlap between organizations or require cognizance between organizations.

Once established, the best practices for data communications RFI can be endorsed by CGMS-54 and used to assist members implement a standard approach for assessing RFI and developing more robust systems and processes for minimizing data communications loss due to RFI.

Six intersessional meetings have been tentatively planned. The first is scheduled on 29 July 2025. The remaining are planned for 11 September, 16 October, 27 November, 15 January, and 12 February 2025. Additional dates may be scheduled depending on the progress made by the team.

3 ACTIONS AND/OR RECOMMENDATIONS FOR CONSIDERATION BY CGMS WORKING GROUP I

Recommendation: Working Group I to instruct TGRFI to:

a. Complete the establishment of a set of best practices for data communications (i.e. DCS) RFI, based on the common aspects of the approaches already adopted by members for CGMS endorsement.
b. Identify RFI detection and mitigation related AI projects that may overlap between organizations or require cognizance between organizations.

4 CONCLUSION

The Task Group on RFI Detection, Monitoring and Mapping began its work in 2022, and since then, has collected inputs describing how CGMS members are assessing the impact of RFI. The Group has since identified common ways of using this information as a basis for developing a set of best practices, such as passive remote sensing RFI and data communications RFI, which can progressively be endorsed by CGMS and be used to help members implement a standard approach for assessing, processing, and potentially mitigating RFI. The current Best Practice being requested for endorsement is focused on the most challenging of RFI, that of passive band corruption and will be presented for review at CGMS-53 WGI. The continuation of the best practices by TGRFI will address the ever-present RFI being experienced by CGMS member data communications, such as DCS. The AI/ML and pattern recognition action item may be a critical component for future RFI identification and mitigation. As the submitted document concludes, by “embracing AI, ML, and pattern recognition, CGMS members can enhance their ability to detect and mitigate RFI, ensuring the continued success of meteorological satellite missions and the availability of high-quality data for critical applications.”