SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

P4.544

On-Site Inspection Communications System

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CTBTO PREPARATORY COMMISSION | PUTTING AN END TO NUCLEAR EXPLOSIONS

INTRODUCTION AND MAIN RESULTS

The On-Site Inspection (OSI) Communications System is an advanced framework enabling secure and reliable communication during inspections under the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Designed for rapid deployment anywhere in the world within six days, it ensures real-time coordination across inspection areas of up to 1,000 km², even in remote locations with limited infrastructure. The system combines broadband satellite platforms, UHF/VHF/HF radio, and satellite telephony to provide robust and redundant coverage.

This poster provides information on the Communications System's concept, objectives, and technologies. Furthermore, it summarises key findings from recent OSI exercises and highlights recommendations and preparations being addressed in advance of future exercises, including the Integrated Field Exercise in 2026.

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P4.5-544

Aim and Objectives

The aim of the On-Site Inspection (OSI) Communications System is to provide a robust, flexible, and secure framework for communication during an on-site inspection. Its objectives are to:

- Enable real-time coordination between the inspection team and the Operations Support Centre (OSC), located at the Technical Secretariat's headquarters in Vienna, as well as between inspection sub-teams.
- Ensure secure voice, data, and video transfer independent of local infrastructure.
- Maintain operational continuity through redundancy and overlapping systems.
- Rapidly deploy and achieve full operational capability within six days, in line with timelines in the CTBT.

The system must be:

- ❑ **Scalable:** Adaptable to varied inspection areas and team sizes
- ❑ **Secure**: Using encrypted channels for sensitive inspection data
- ❑ **Resilient:** Tested across diverse terrains and environmental conditions
- ❑ **Integrated:** Interoperable with OSI data management systems

Concept and Implementation

The system integrates multiple layers of technologies to ensure reliability across an inspection area of up to **1,000 km²**, including remote or infrastructure-poor regions:

- **Broadband satellite platforms** (which might include e.g., Starlink or OneWeb) for high-speed data transfer.
- **Ultra High-Frequency (UHF) and Very High-Frequency (VHF) radio networks** for resilient local communications.
- **Iridium (commercial off-the-shelf) satellite phones** as a global backup.
- **Redundant and overlapping architectures** to safeguard against single-point failures.

Components are transportable and designed for rapid setup, drawing on lessons learned from the 2023 Directed Exercises that were conducted in Austria and the 2024 Build-Up Exercise that was conducted in Hungary, in preparation for the Integrated Field Exercise in 2026 (IFE26).

Findings and Lessons Learned

Field testing during recent OSI field exercises demonstrated:

- High reliability of broadband satellite systems for continuous data flow.
- Effective redundancy when combining multiple communication methods.
- Need for continuous training to familiarise inspectors with evolving technologies.
- Importance of coordination with OSC for synchronised information flow and situational awareness.

Outlook and Way Forward

The OSI Communications System continues to evolve in step with the OSI Exercise Programme. Preparations for IFE26 will include a **dedicated communications field test in early 2026** to validate operational readiness. Lessons from past exercises will ensure that communications remain a global benchmark in supporting non-proliferation and verification efforts under the CTBT.

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