IAEA-ESA Collaboration: Setting up an Operational Service for the Safeguarding of Nuclear Facilities

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International Atomic Energy Agency

Outline

- Safeguards
- Equipment
- Remote Monitoring (RM)
- Project with ESA

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Introduction to IAEA Safeguards

- The IAEA is the world's nuclear inspectorate.
- Safeguards is the largest Department.
- The IAEA inspects nuclear and related facilities under safeguards agreements with more than 145 States around the world.

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Safeguards Surveillance Camera

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RM-Ready Equipment – *Electronic Seal*

- Connects directly to camera or server
- Remotely verifiable

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Remote Unattended Systems

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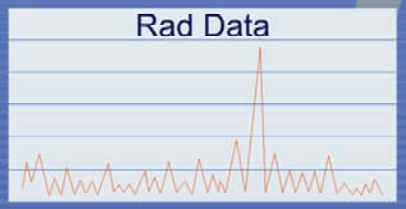
Remote Monitoring – Global Data Flow



Introduction to Remote Monitoring

- Secure, reliable, economical communications from facilities to the IAEA to transfer surveillance, radiation, and seal data.
- State of Health (SoH) to monitor equipment.
- Remotely troubleshoot & reconfigure
- Save inspection effort, limit exposure, and operator interruption.

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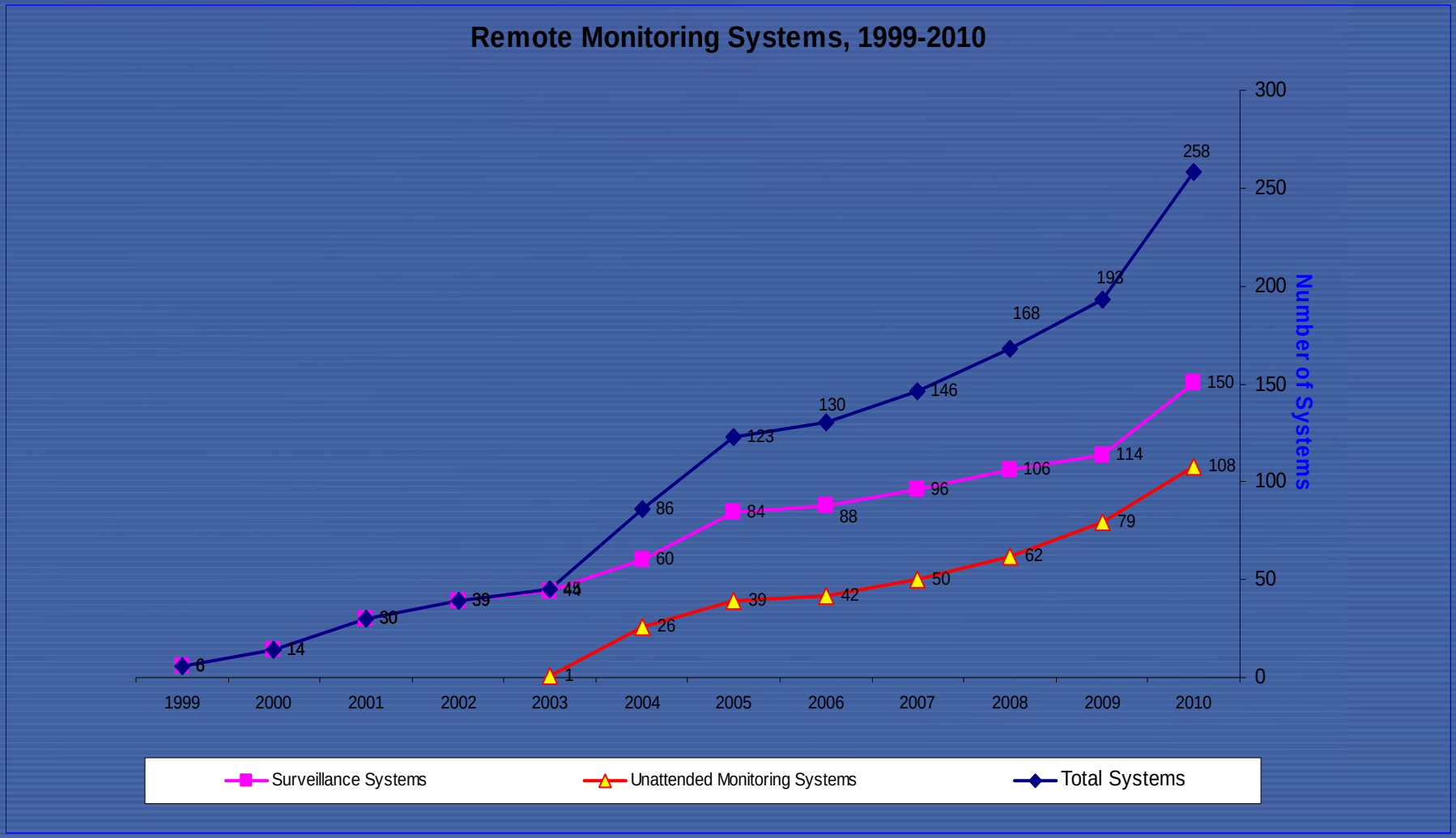
RM Unit – Current Statistics



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SGTS/TSR/RM Unit – Statistics Mar. 2011

- Total 258 systems with RM capabilities in 20 countries.
- 150 Surveillance Systems (569 cam.).
- 108 Radiation Detection Systems.
- approximately 3.5 G/day.

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Communication Options Used

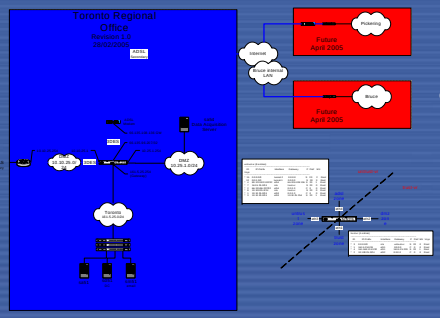
- Public switched telephone network (PSTN)

- Integrated Services Digital Network (ISDN)

- Very small aperture terminal (VSAT) satellite network

- Asynchronous Data Subscriber Line (xDSL)

- Wireless (802.11g) Internal facility use.
- GSM EDGE technology for Internet access



- LAN-Sharing

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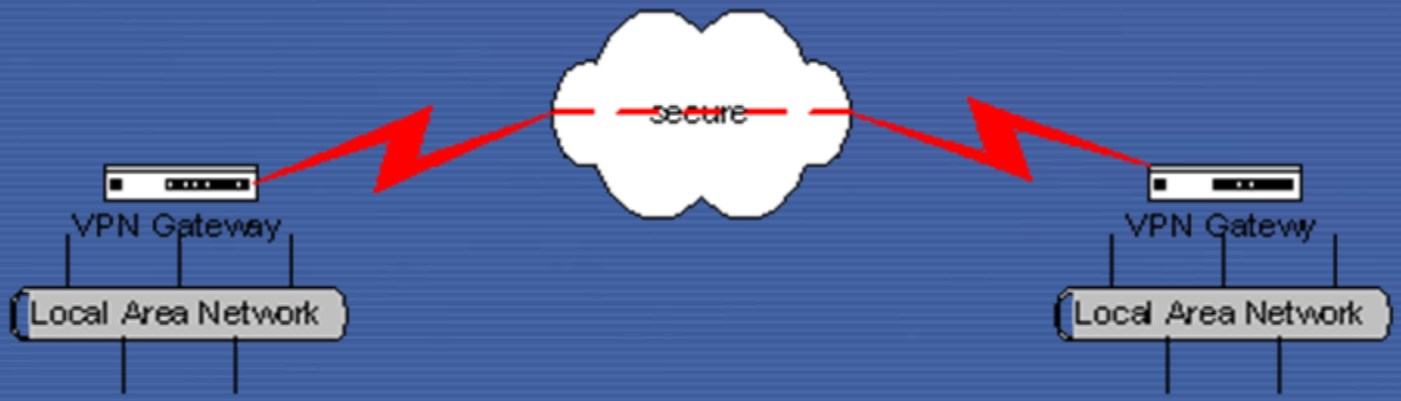
RM – Virtual Private Network



- COTS VPN hardware.
- Approx 120 global VPN tunnels.
- 2004 & 2009 Vulnerability Assessment performed.

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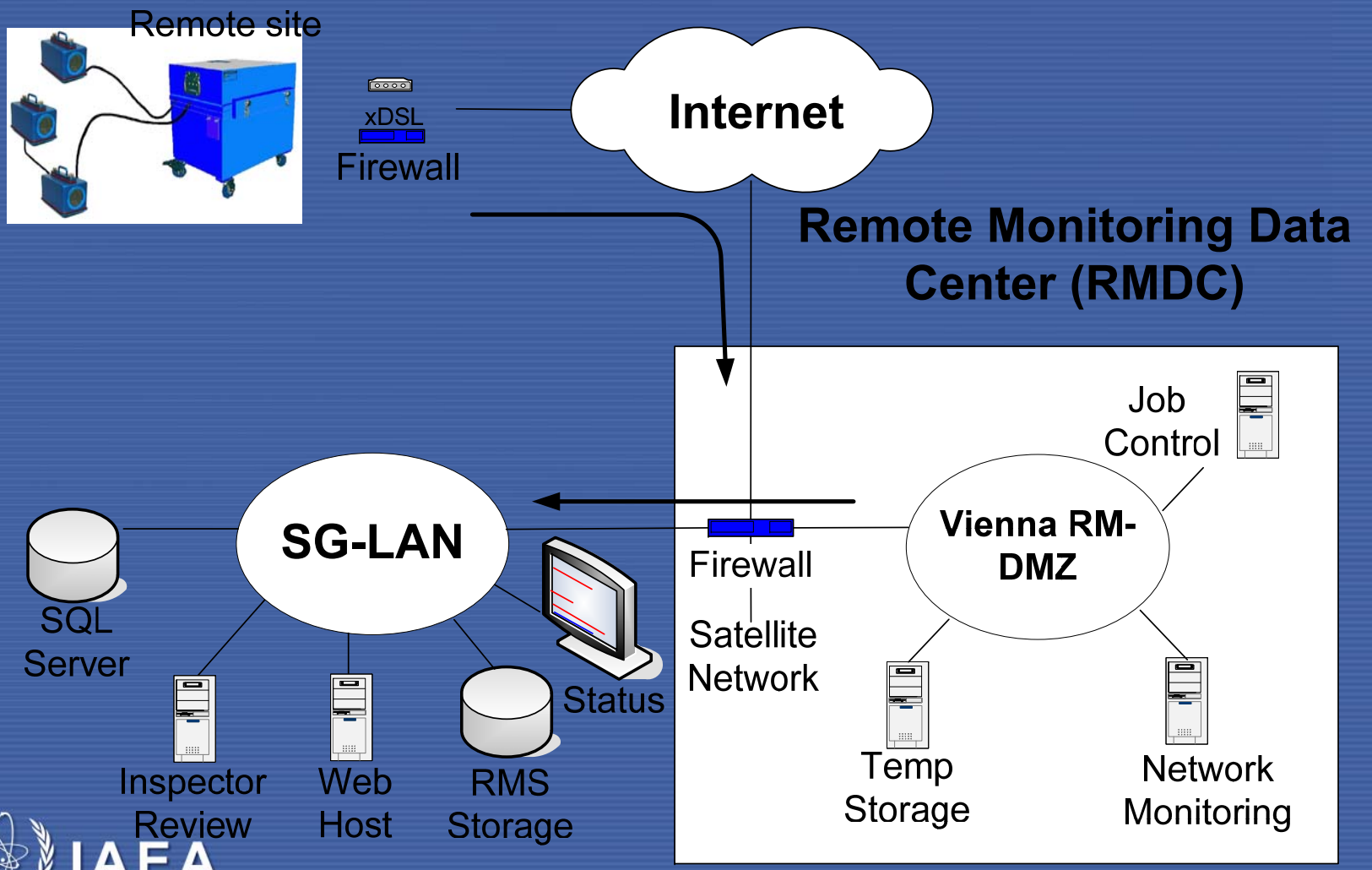
RM Data Flow



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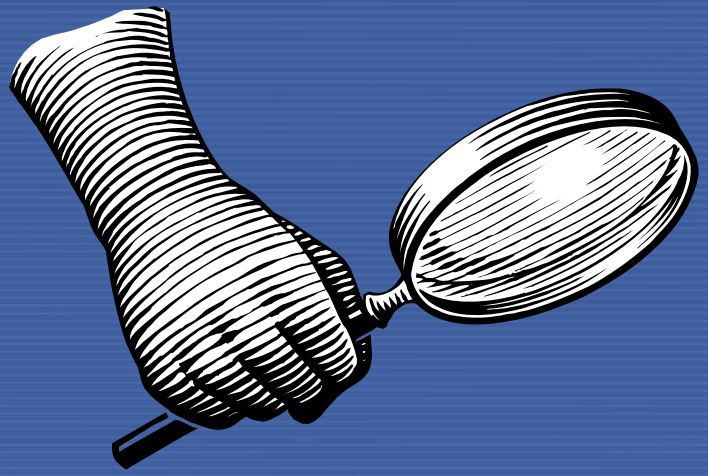
RM – Remote Troubleshooting



- Reboot servers
- Stop/start services
- Repoll cameras
- Many other operations

- Saves tech visits
- Reduces facility operator interruptions
- Limits exposure.

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The IAEA and Japan

- The IAEA involvement with current activities with Japan are main through the Agency's Incident and Emergency Centre.

- Established after Chernobyl, the Centre is hosting communications with Japanese officials, IAEA engineers, and other outside experts.

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ESA – IAEA Project

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ESA – IAEA Project Timeline

- 2006 ESA/IAEA partnership began with commissioning 2 feasibility studies on satellite communications for Safeguards (Esys & Paradigm Services).
- Sep 2006 Final presentation of studies at Vienna HQ
- Oct 2006 IAEA requirements for the ESA Pilot Project
- Jul 2007 Bid awarded to ND Satcom
- Jul 2009 Pilot started
- Jan 2010 Pilot completed

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ESA – IAEA Project Delays

From Jun 2007 to Jul 2009:

- Member State Agreement
- Facility Agreement
- Licensing

- Sensitive Locations

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ESA – IAEA Project Technology

- Pilot began with DVB-RCS (SkyARCS) technology & 3 remote sites.
- Sesat-1 satellite
- Proprietary SkyWAN system using MF-TDMA was tested.

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ESA - IAEA Satellite Project

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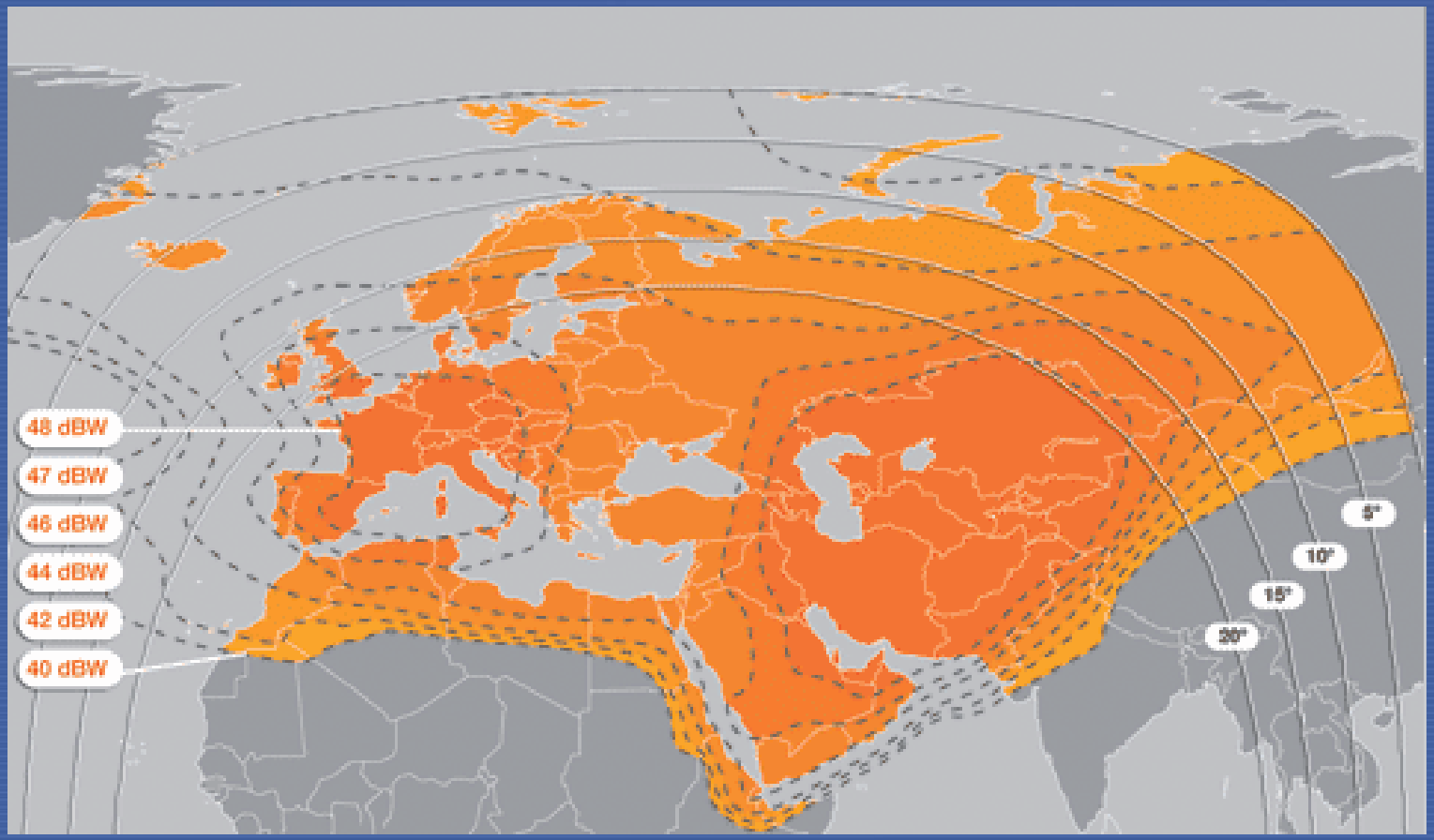
RM – Initial Satellite Coverage



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ESA – IAEA “Lessons Learned”

- Permission/licensing for satellite communications can be time consuming.
- Asymmetric star topology .
- Inroute bandwidth > Outroute bandwidth.
- Remote terminals sharing Inroute.

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ESA – IAEA “After the Pilot”

- SGTS agreed on a contract with ND Satcom for services in 2010-2012.
- STGS has re-installed remote sites with SKYWAN technology.
- Network is economically sustainable.
- New sites are being planned.

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IAEA Future Satellite Work

- Possibly more connections in Eastern Europe & Central Asia.
- Critical coverage of high priority countries.
- Modifications to in-house developed transfer program to make satellite communications more efficient.

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RM – Conclusion

- Partnership between ESA & IAEA allowed the Agency to gain valuable satellite implementation experience.
- Satellite technology will provide Safeguards communications in countries with developing infrastructure.
- Satellite technology will provide a vital capability, but will not replace terrestrial communications.
- Satellite technology will provide coverage to any possible geographic region.
- The ESA integrated application programme user driven strategy has been at the heart of generating this synergy.

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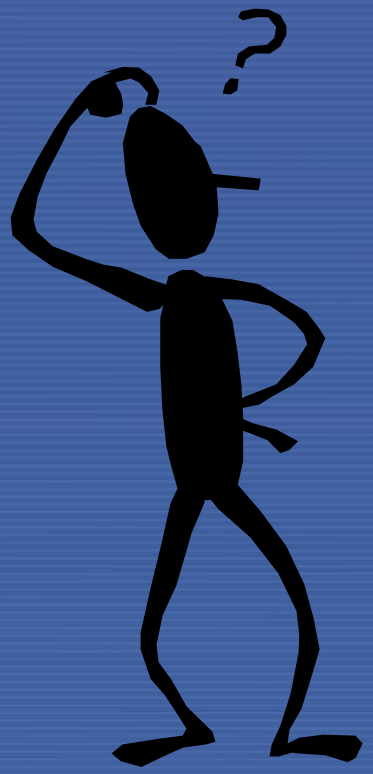
Questions ?



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Armenia

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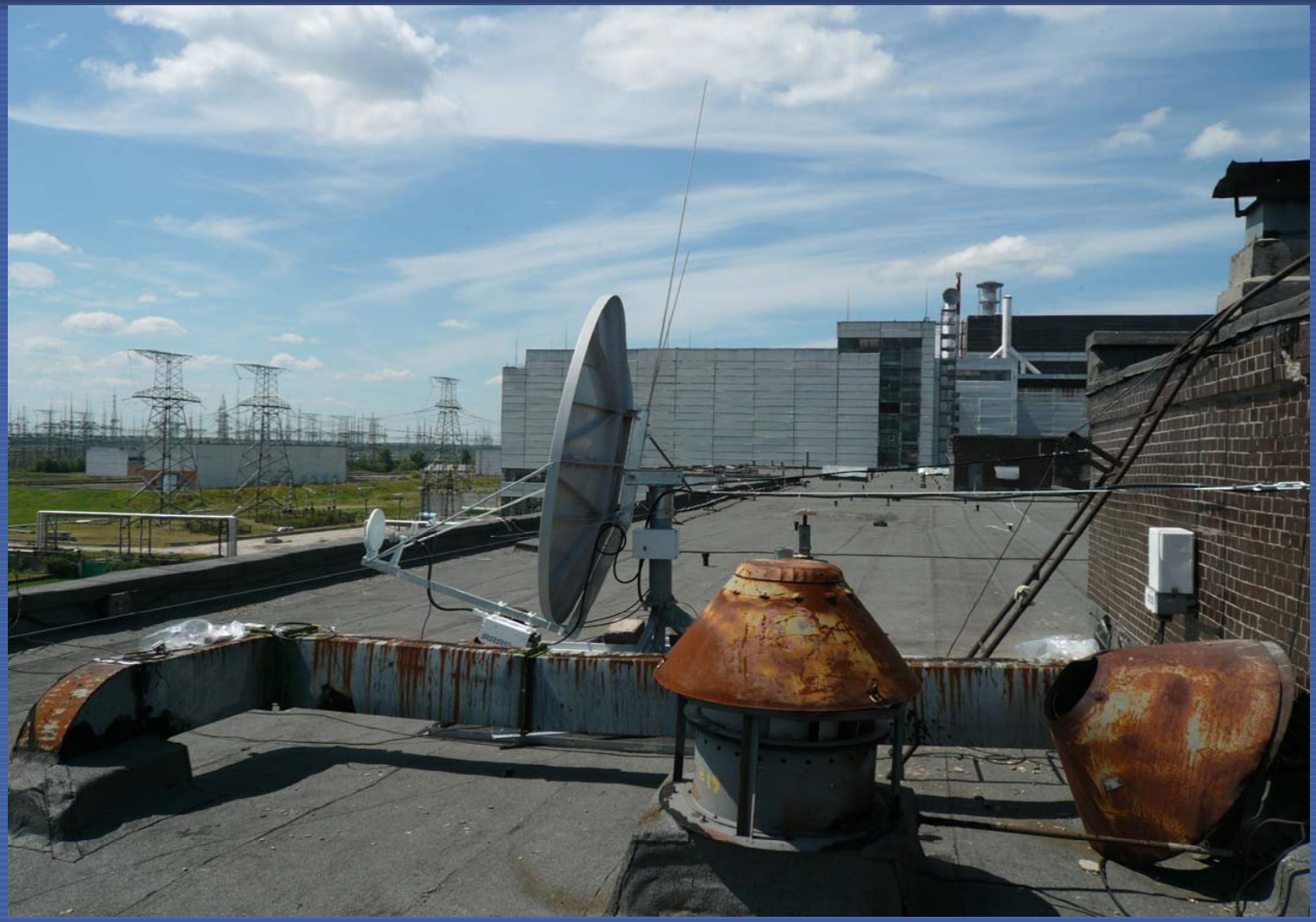
Chernobyl



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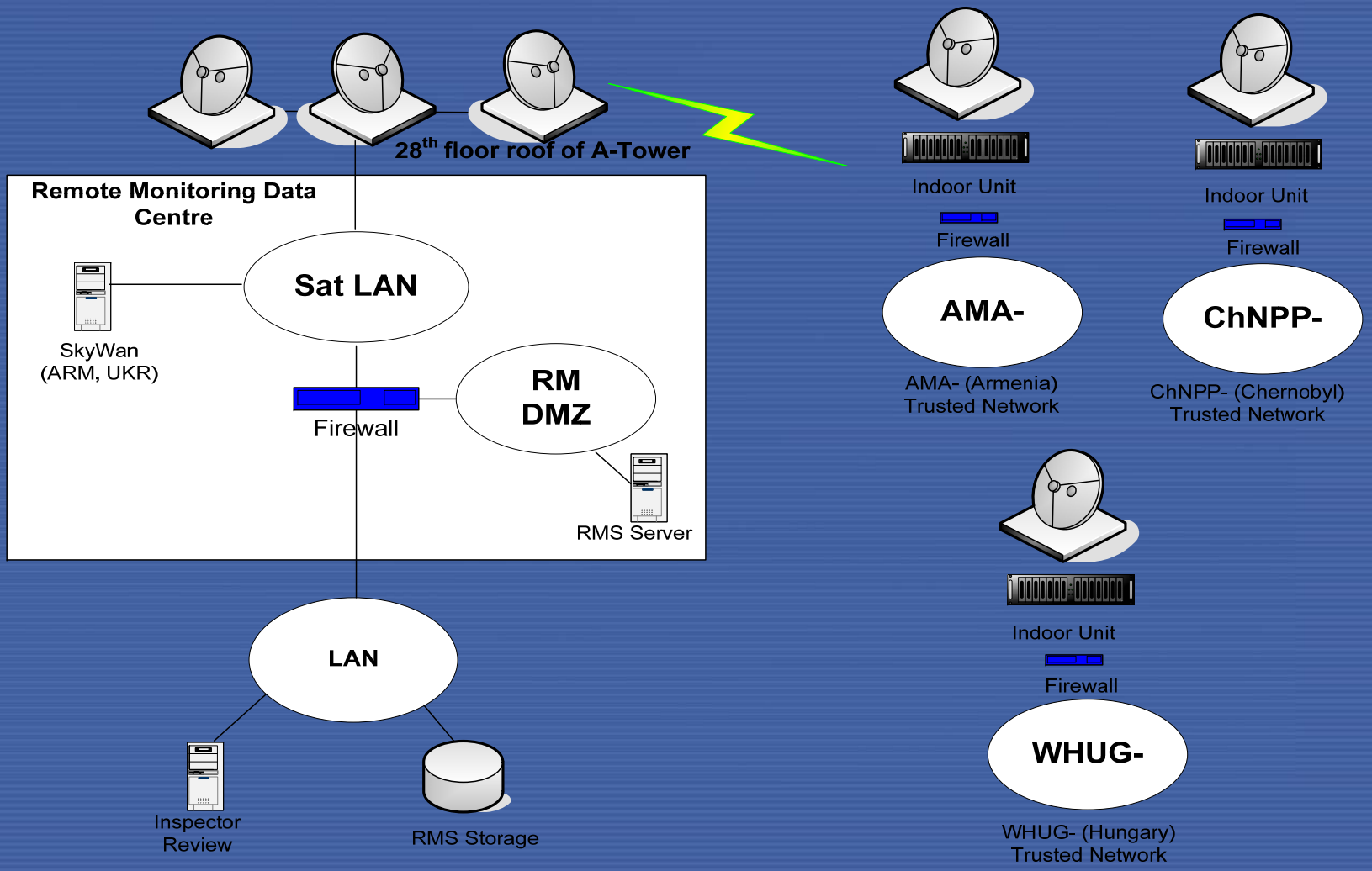
RM – Satellite Pilot Network



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