CRFS

EXTRAORDINARY
RF TECHNOLOGY

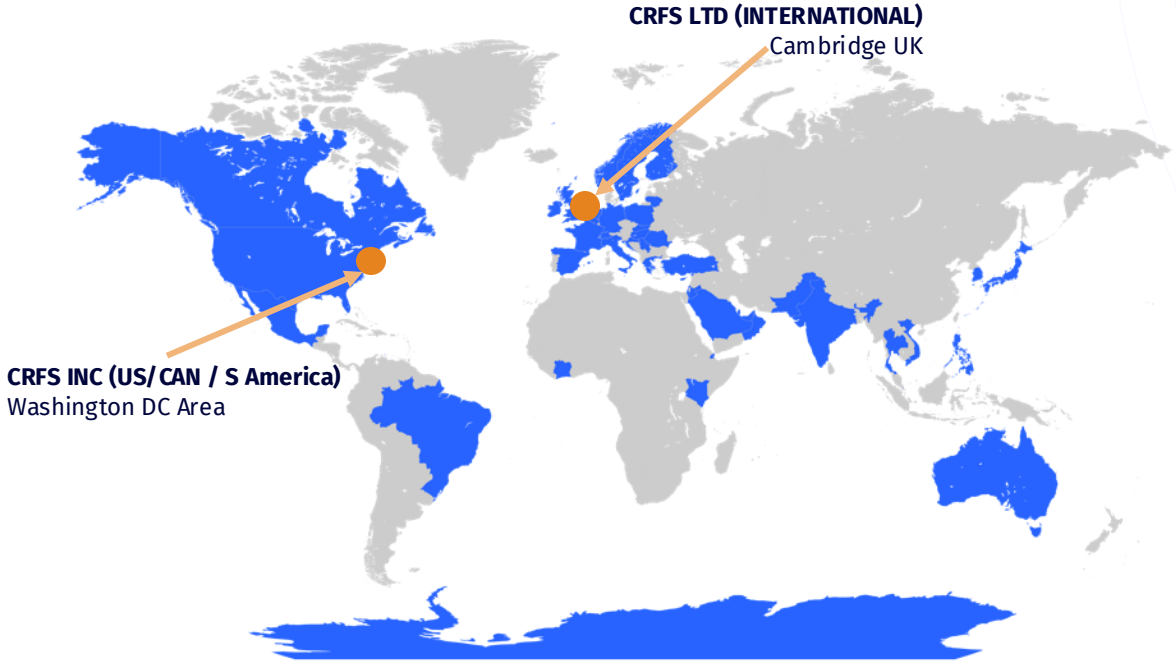
BRIEFING

AGILE EMISSION CONTROL AND SIGNATURE MANAGEMENT TRAINING

COMPANY OVERVIEW

CRFS creates deployable technology to detect, identify and geolocate signals in complex RF environments.

Our systems are used worldwide by regulatory, military, system integrators, government security agencies, and corporates.



OUR MISSION

To provide our customers with actionable spectrum intelligence across the widest possible frequency range in any environment.

CUSTOMERS VALUE ANSWERS RATHER THAN DATA

- Transmitter Geolocations
- Signal Captures
- Signal / Transmitter Classification

CUSTOMERS/PARTNERS

Ministry of Defence

NATO OTAN

NASA

TEKEVER

RAFAEL ADVANCED DEFENSE SYSTEMS LTD.

ELISTAIR THE TETHERED DRONE COMPANY

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AGENDA

- EMCON vs PACE
- Threat assessment process
- Blue Force and baselines
- Net assessment
- EMCON planning tips
- Training and refinement

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THE THREAT

Detect to Engage Timelines in Ukraine

>1-5 MINUTES: **Detection/Geolocation of Signals**

+ Drone overhead (within 5 min)

10 MINUTES: **Pass to Artillery and Rounds fired**

=

10-15 MINUTES: Artillery Rounds overhead

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COMPARISON

EMCON vs PACE

WHAT IS PACE

- Primary, Alternative, Contingency, Emergency
- “How do we keep talking”
- Communications focused only on 4 transmitters
- 99% of the time, doesn’t consider threats.

WHAT IS EMCON

- Emissions Control
- “how do we stay hidden, undetected”
- Threat based planning
- Includes all Transmitters (RADAR/DATALINKS

EMCON=PACE plans + Electronic Protection TTPs

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PACE PLAN

NET	PATHWAY
Primary	Fiber
Alternate	UHF SATCOM
Contingency	SHF SATCOM
Emergency	HF Longhaul

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COMMON MISTAKES

PACE PLAN

- **CONSIDER EMAIL ADDRESSES AS A PATHWAY**
  - (GOVT networks arent transmission pathways, STARLINK is)

- **CLASSIFIED NETWORK IS *P* AND THEN UNCLASSIFED NETWORK IS *A***
  - Unless you use 2x seperate pathways, you will get to C very quickly

- **NO VARIANCE IN FREQS**
  - One SATCOM to another SATCOM, what about HF comms (spread the spectrum)

- For SOF, doesn't consider country-codes based meta-data in Digital Radio Headers that when decoded can be attributed. (e.g US country codes deep in a Baltic State)

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EMCON LEVELS

EMCON	Guidelines
1 **RADIO ROUTINE**	**Transmissions:** RADIO ROUTINE. Any and **all radio calls** are authorized. [1] **Emitters:** Any and all comm emitters are authorized. All non-comm emitters are authorized: PED, vehicles, generators, radars. **Adversary:** IMPROBABLE (45%) ES collections or EA. REMOTE (5%) threat of receiving fire (IDF). **Scenario:** Garrison or friendly country. Training, evaluations, and administrative movements. **Note:** Even during training, leaders should limit radio calls to mission-critical information.
2 **RADIO ESSENTIAL**	**Transmissions:** RADIO ESSENTIAL. **Mission-critical** and emergency **radio calls ONLY**. [2] [3] **Emitters:** Any and all comm emitters are authorized. All non-comm emitters are authorized. Emitters are SHUT OFF except when in use. Constant emitters (BFT / JBC-P, ALE / 3G ALE HF, and ANW2) are restricted or OFF. Non-essential PED is OFF. **Adversary:** PROBABLE (80%) ES collections or EA. IMPROBABLE (45%) threat of effective IDF. [4] **Scenario:** Friendly, neutral, or hostile country. Contingency operations or pre-hostilities. **Note:** **EMCON 2 is the desired standard for operations.**
3 **RADIO SILENCE**	**Transmissions:** RADIO SILENCE: **NO voice radio calls**. Text and burst data only. HF ideal. Wire. **Emitters:** Selected bands are restricted, receive-only, or OFF. Constant emitters (BFT / JBC-P, ALE / 3G ALE HF, and ANW2) are OFF. Unencrypted UHF black gear is OFF. Non-comm emitters are restricted or OFF. Passive receivers—GPS, GBS—are restricted or OFF. Voice CFF / CAS are OFF. **Adversary:** HIGHLY PROBABLE (95%) ES collections or EA. PROBABLE (80%) threat of IDF. **Scenario:** Conflict. Enemy is collecting and targeting. Precision IDF weapons are in range. **Note:** Some units, executing fast-moving operations without key equipment, cannot rely on chat.
4 **BLACKOUT**	**Transmissions:** BLACKOUT. **NO radio calls**—voice or data—**are authorized**. **Emitters:** ALL emitters are OFF. ALL radios, ALL PED are OFF. Batteries are OUT, generator power is off. ALL non-comm emitters are OFF. Vehicles are OFF. Lights are OFF. **Adversary:** NEARLY CERTAIN (99%) ES collections or EA. HIGHLY PROBABLE (95%) threat of IDF. **Scenario:** Conflict. Enemy is collecting and targeting. Precision IDF weapons are activated. **Note:** When missiles are inbound, units avoid being located, but cannot operate long at EMCON 4.
Notes: 1. Specific EMCON actions taken under each option are defined by each unit for each operation. Restrictions on calls, nets, bands, and equipment are clearly defined by unit SOP. 2. Unit PACE plans specify alternate comms. 3. For emergency radio calls, leaders violate EMCON for safety, enemy engagement, or CASEVAC. 4. Adversary descriptions are ICD 203 language on the *likelihood* of enemy action. An actual attack or EA may *not* yet have occurred.	

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EMCON PLAN

	List of Authorized Emitters: Convoy Operations		EMCON			
	Equipment	**Freq/Power**	**1**	**2**	**3**	**4**
1	Radio: VHF FH Voice	All / 10W	ON 1	ON 1	Off 2	Off 2
2	Radio: PRC-150 HF ALE CHAT	All	ON + Voice	ON + Voice	ON	Off
3	Radio: PRC-117G UHF MUOS CHAT	All	ON 3	ON 3	ON 3	Off 3
4	Radio: UHF (PRC-113, PRC-117)	All	ON	ON	OFF 4	OFF 4
5	Radio: SATCOM	-	ON	ON	Off 2	Off 2
6	Computers (non-communications)	NA	ON	ON	Off	Off
7	PED	-	ON	Off GPS Auth	Off GPS Auth	Off GPS Auth
8	UAS	-	ON	ON	Off	Off
9	Vehicle: JBC-P / BFT / TC	-	ON 5	ON 5	Off 2	Off 2
10	Vehicle: C-IED / CREW UHF	-	As needed	As needed	As needed	Off
11	Vehicle: Intercom	-	ON	ON	Off 6	Off

Notes: 1. Minimize calls in the assembly area. RP departure is particularly noisy and vulnerable. Restrict power to 10W.
2. NO voice at EMCON 3. Emergency calls are authorized only for safety, enemy contact, or CASEVAC.
3. All POSREPs are MUOS CHAT, except at EMCON 4. SEND only mission-essential reports.
4. NO voice at EMCON 3. Vulnerable UHF for emergency air coordination only: CAS, MEDEVAC.
5. JBC-P/BFT position reporting is Off. TC authorized to send text.
6. NO voice at EMCON 3. Convoy CDR can authorize intercom for specific elements, like security, for specific times.

This is the GOAL, Every Mission, Every Unit

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BUILDING THE EMCON PLAN

1. Create a list of Authorized Emitters
2. Obtain EW/SIGINT Threats from Intelligence (2 shop)
3. Conduct a Net Assessment (red vs blue)…aka mini wargame
4. Create multiple PACE plans based on threats
5. Add in Electronic Protection TTPs
6. Add in time and phasing, triggers
7. Publish EMCON plan, deconflict across & up/down echelons

EMCON=PACE plans + Electronic Protection TTPs

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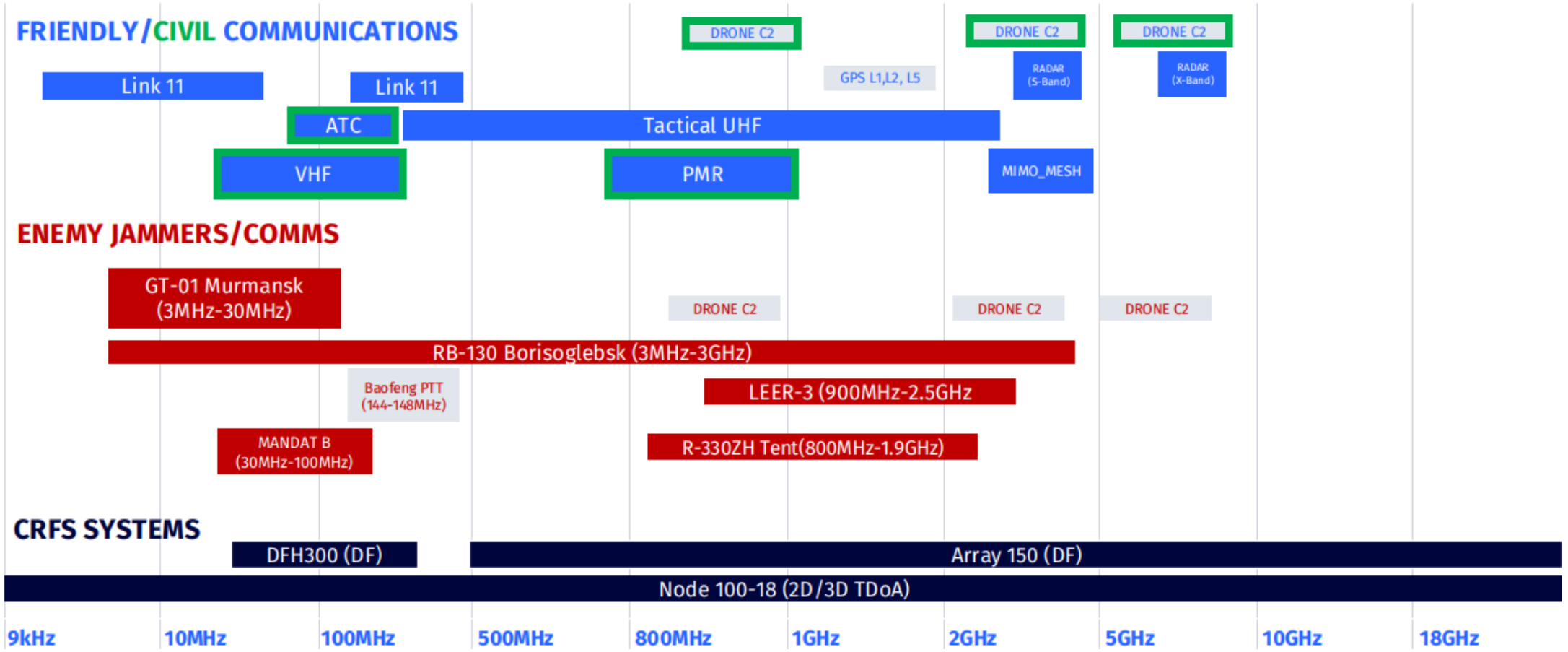
CREATE A NET ASSESSMENT



FREQUENCY RANGE

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ELECTRONIC PROTECTION TTP (EXAMPLES)

Process. TRAIN to the *Ten Commandments* IOT REDUCE radio EM emissions.

The Ten Commandments

	Technique	Guidelines
1.	**TALK Less**	TALK **less**. TRANSMIT only **mission-critical** information. TALK **short**. TALK **correct**.
2.	**SCHEDULE Less**	MINIMIZE required **reports**. SCHEDULE comm **windows**.
3.	**MOVE**	MOVE **units**. MOVE **radios**. When in doubt, MOVE.
4.	**CHAT**	CHAT. Do NOT **call**. CHAT reports, requests, and brevity codes.
5.	**SIGNAL**	SIGNAL **movement**, **tactical action**, and **convoys** with one-arm hand and arm signals.
6.	**WIRE**	COMMUNICATE between stationary positions with **comm wire** and field phones.
7.	**MASK Antennas**	PLACE CP, vehicle, and manpack antennas behind **barriers**, **buildings**, **woods**, or **hills**.
8.	**REDUCE Power**	SHUT it OFF when not in **use**. SET radio to **low power**.
9.	**PRIORITIZE LPD Nets**	COMMUNICATE on **radio nets** that have LPD. KNOW which nets are more **vulnerable**.
10.	**PLAN Simple Flexible Ops**	PLAN operations that require **less radio calls.** PLAN **less nets**.

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TEST TO TRAIN…
TRAIN TO SURVIVE

- An EMCON plan on paper only means nothing.
- A validated EMCON plan does..
- Need to test EMCON TTPs against EW threats
- CEMA teams are High DEMND, low SUPPLY
- CRFS Solutions enable training in Garrison, Parade decks

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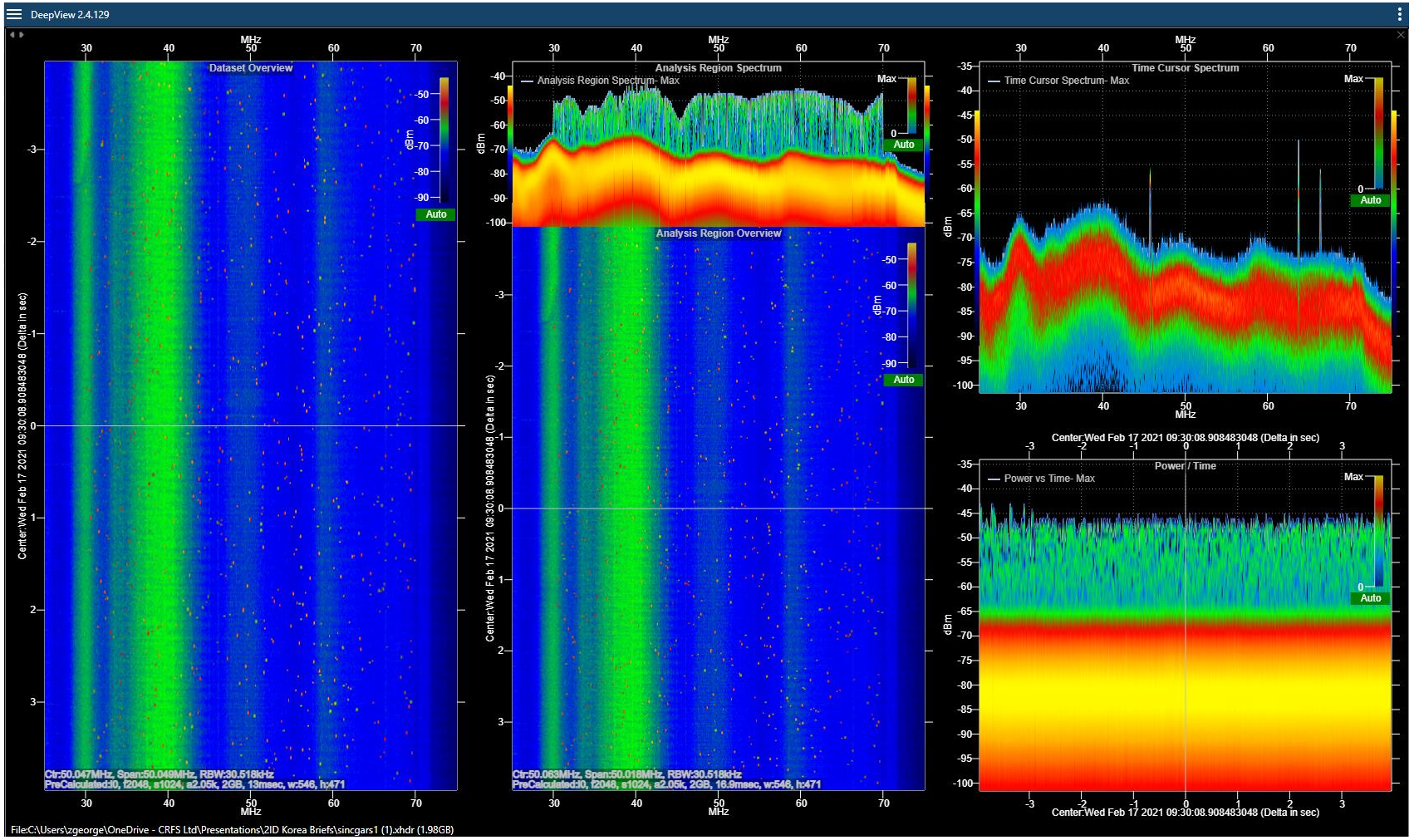
USE CASE: SINCGARS



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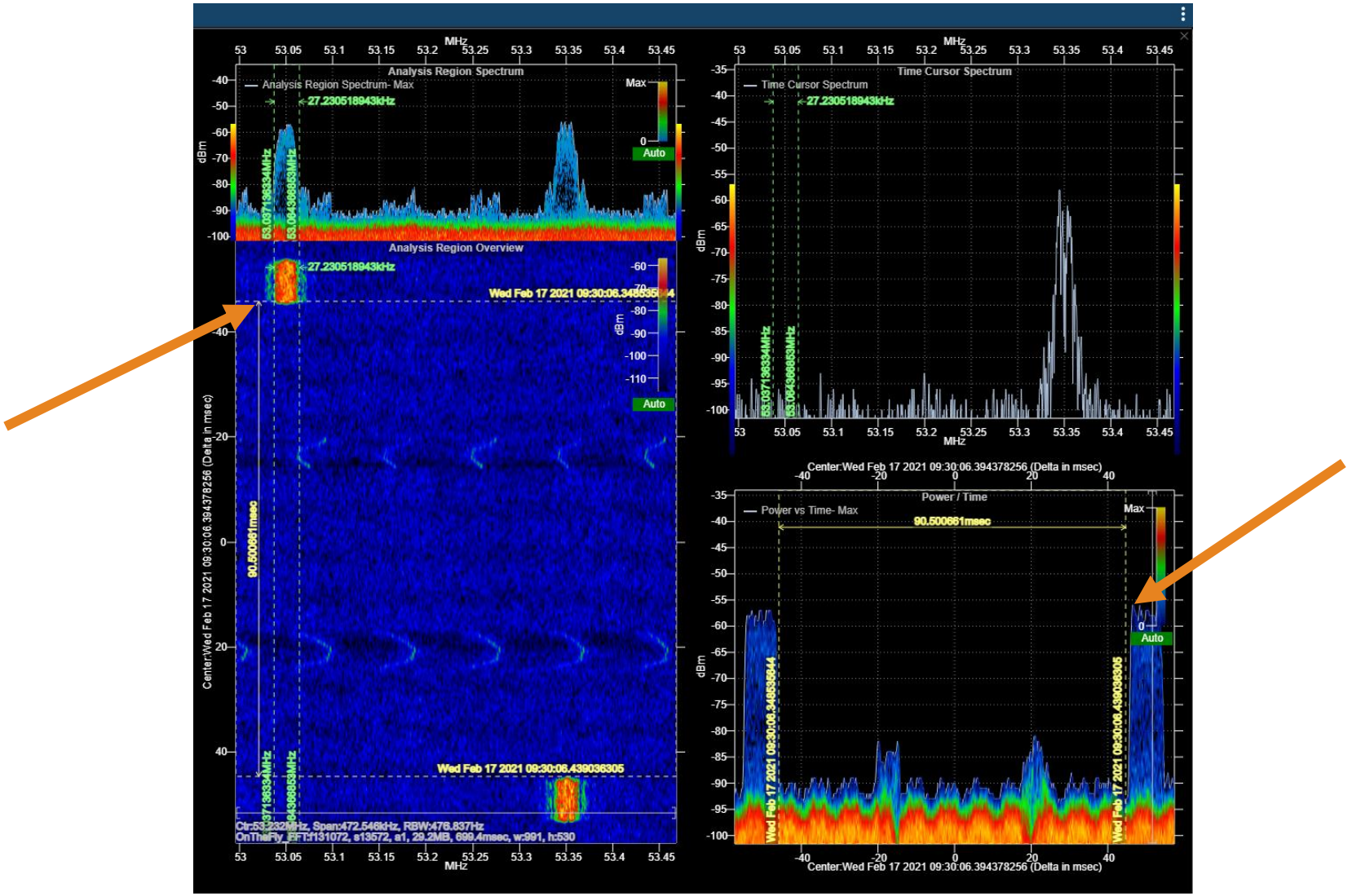

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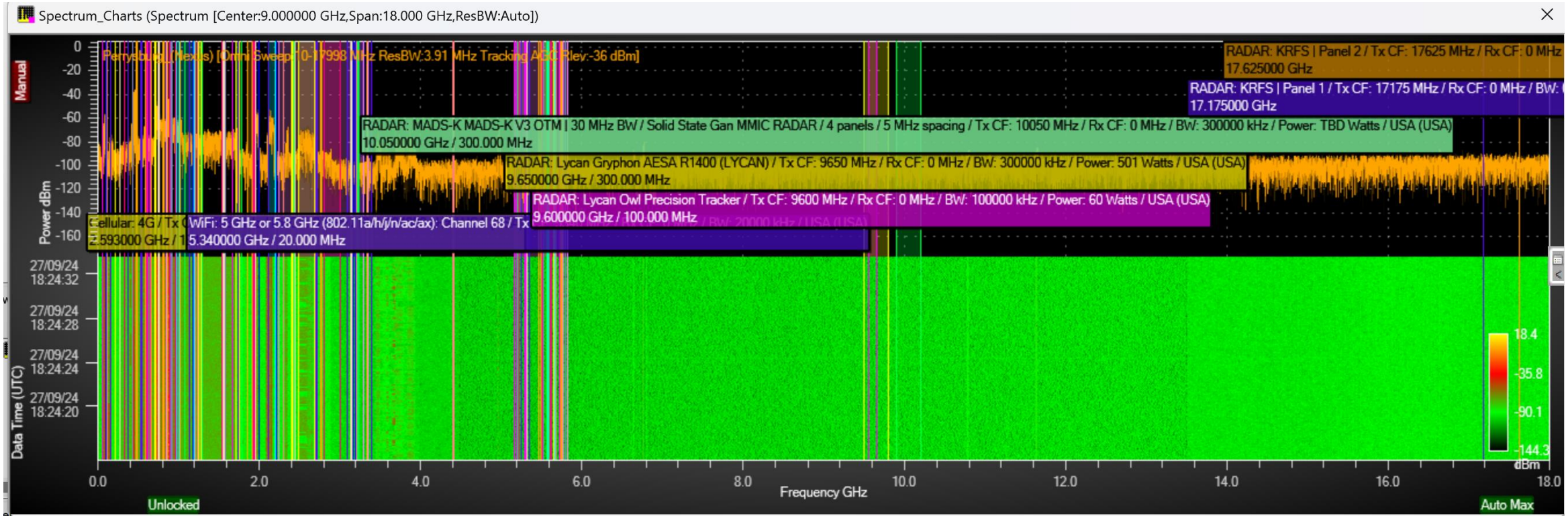
ADD THE LIST OF AUTHORIZED EMITTERS



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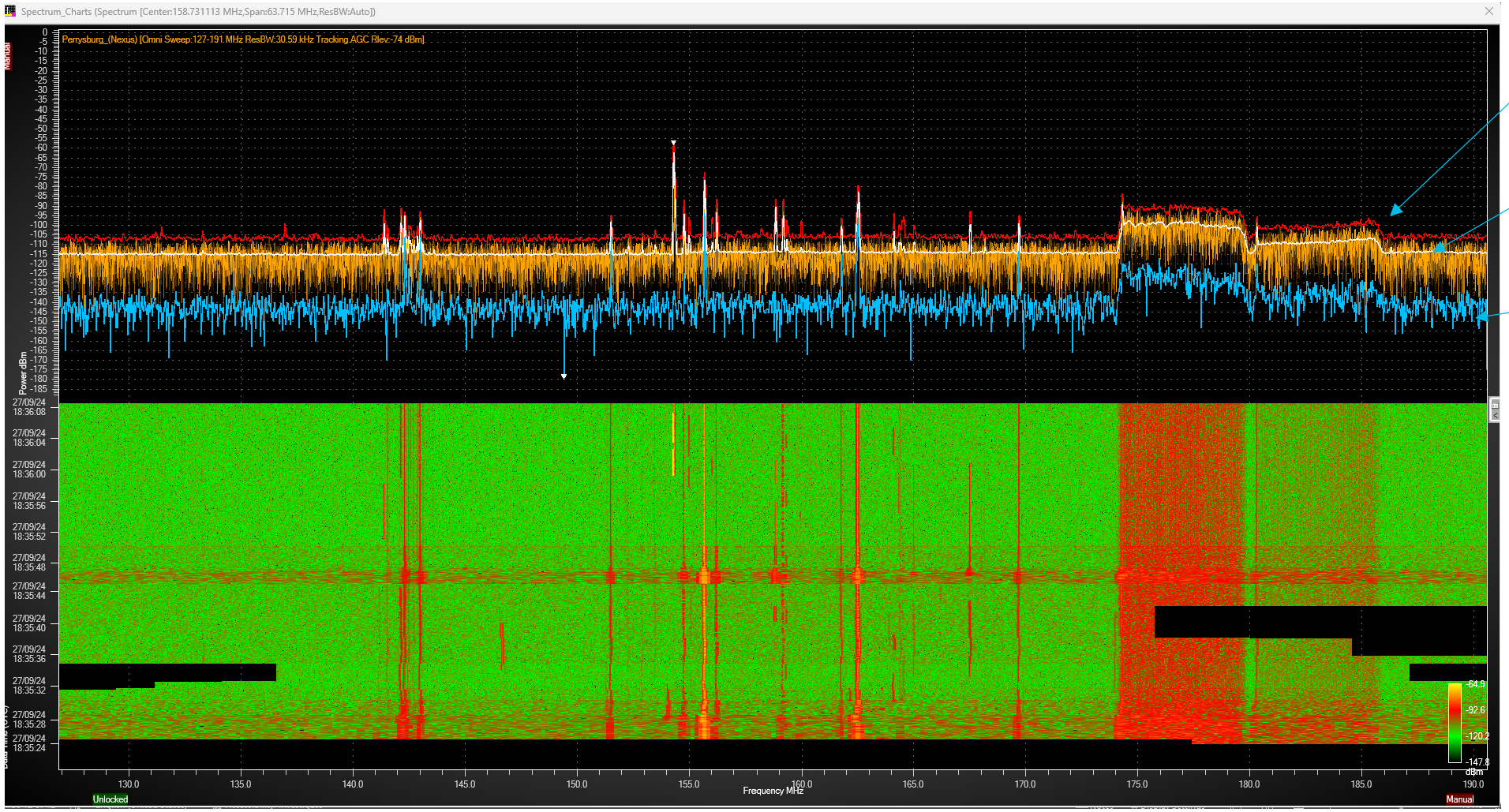
RECORD MAX/MIN/ AVG ON EACH EMITTER



TAILOR YOUR OPFOR

Make your EW OPFOR mimic simple to advance threats (with one RF sensor)

BASIC

WHO
- Amateur Radio OPSEC Violations
- Gray Zone Intelligence Agents

SENSORS MIMIC'D
- Cheap SDRs
- Bad sensitivity and freq range

INTERMEDIATE

WHO
- Military Force with Old Equipment
- Assumed that JFRL was compromised

SENSORS MIMIC'D
- Good Sensors, but basic functions
- No detectors or AI/ML assistance

ADVANCED

WHO
- Advanced near-peer military
- Assume intimate knowledge of friendly signals

SENSORS MIMIC'D
- Advanced SIGINT
- Advanced AI/ML capabilities

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SUMMARY

- PACE isn’t enough.
- “White carding” the EW threat isn’t enough.
- Your CEMA units are HIGH demand, LOW supply.
- Enable communicators to train themselves, be their own OPFOR.
- COTS systems enable this + more interoperability with partners, anywhere, anytime.

VISIT US AT THE BOOTH FOR LIVE DEMOS

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THANK YOU

We hope you found this presentation useful. If you have any questions, please ask.

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