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Interoperability test results between Harris RF-5800H, Rohde & Schwarz M3SR and Selex HF2000

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Background

The Swedish Armed Forces have Harris RF-5800H HF manpack radios and SELEX HF2000 radios in its inventory. These will be interoperating in the same radio nets.

⇨ Interoperability problems noted in some configurations

Ensuring 3GALE interoperability during international missions through Combined Endeavor exercises and similar events

- Rohde & Schwarz M3SR

⇨ Test interoperability between three systems to
    better understand reason for behavior mentioned above

Validating that the relevant standard (STANAG 4538) is unambiguous and interpreted in the same way

FMV's role

The Swedish Defence Materiel Administration (abbrev. FMV) and involved consultants handle industry proprietary information on a regular basis. Such information is never shared with other parties
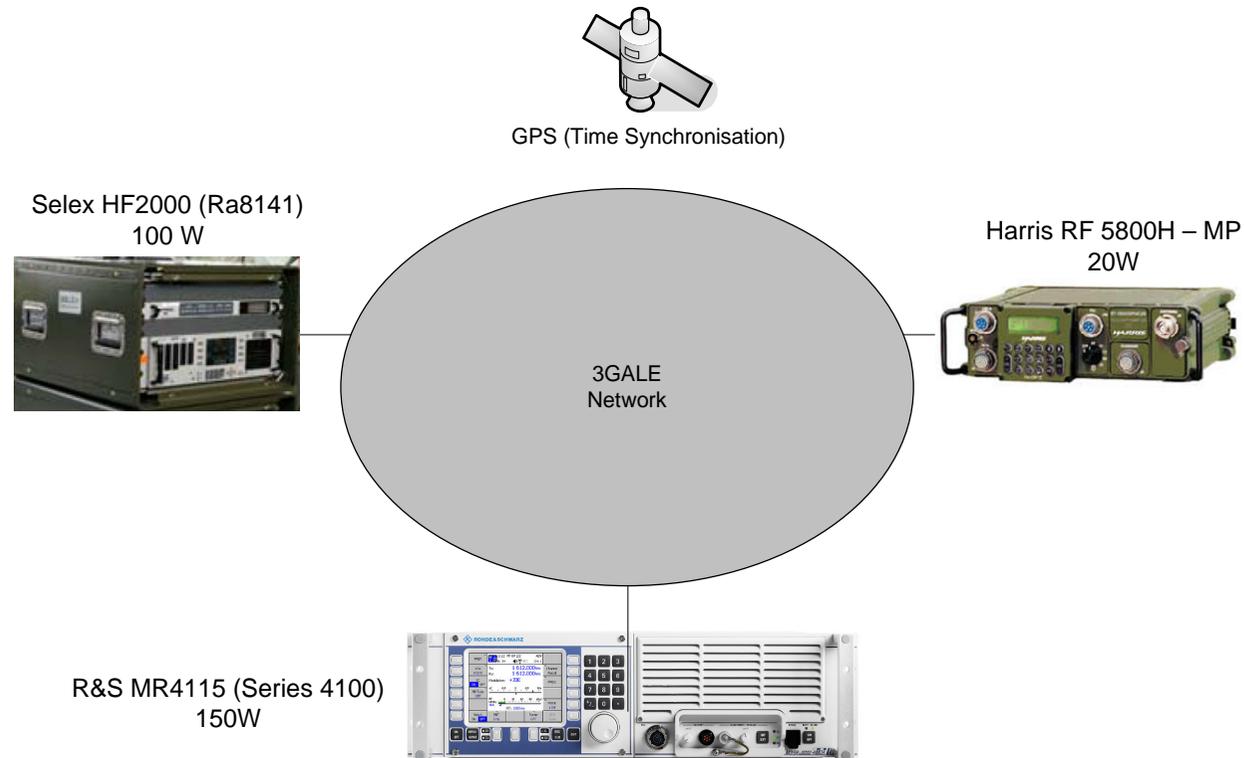
Consequence: FMV may suspect or draw conclusions from behavior during interoperability testing that cannot be distributed to all parties (e.g. radio manufacturers) involved in the testing

FMV informs each radio manufacturer individually about observations made based on

- over-air behavior (the standardized air interface) and the
- behavior of each manufacturer's equipment

to determine possible reasons for the observation in question

Test set-up

- Over-air tests (Växjö, Sweden – Munich, Germany), March 2010
- Lab tests (Munich, Germany), April 2010

GPS (Time Synchronisation)

Selex HF2000 (Ra8141)
100 W

Harris RF 5800H – MP
20W

3GALE
Network

R&S MR4115 (Series 4100)
150W

Purpose

Verify STANAG4538 interoperability

❖ Synchronous scanning (different no of channels in scan group)
  ▪ Asynchronous FLSU, Time acquisition over-air
  ▪ GPS time
❖ Synchronous FLSU
  ▪ Point-to-Point (two-way, confirmed) call
  ▪ Broadcast (one-way, non-confirmed) call
  ▪ Point-to-Multipoint call with Roll call response
  ▪ FLSU followed by Voice / MS-188-110 traffic
❖ Linking protection enabled/disabled

Initial results (TOD ref point)

Synchronous scanning not completely achieved after time acq. over-air:

- ✖ Harris and SELEX in sync only when using 2, 4, 5, 7 or 10 channels in scan group
- ✖ R&S sometimes one dwell behind

Reason:

STANAG 4538 does not define the TOD reference point

- ▪ Start or center of dwell

Recommendation:

- ▪ Clarify TOD reference point to be start of dwell

Initial results (GPS time base)

Synchronous scanning when using GPS as TOD reference:

- ✘ Harris and SELEX in sync only when using 2, 4, 5, 7 or 10 channels in scan group

- ✘ R&S in sync with Harris and SELEX only when using 5 or 10 channels in scan group

Reason:

Different interpretation of STANAG 4538 text regarding

- ▪ Start of a GPS epoch

Recommendation (Use Harris interpretation):

- ▪ The reference point at which counting of dwell periods is started is the start of the most recent GPS epoch. For this purpose, a GPS epoch is considered to start whenever the GPS week counter has the value zero. Hence, (i) a GPS epoch has a duration of 1024 weeks; (ii) a new GPS epoch (the current one) started in 1999.

FLSU link establishment

✓ Point-to-point call worked OK between all stations

✓ Broadcast call worked OK between all stations

✓ Traffic Type detected correctly between all stations

✓ Roll call worked OK between Harris and R&S, not implemented in SELEX

✓ Linking protection Disabled and Enabled (Normal) worked OK between all stations

Observation:

▪ Different ways of entering addresses likely to be confusing to operators

Recommendation:

▪ Guidelines in manuals how to convert/read addresses by using PDU address as base format

Recommendations:

Clarify in updated release of STANAG 4538

❖ TOD reference point to be start of dwell

❖ Use Harris interpretation regarding Start of GPS epoch

Achieving interoperability relies on:

❖ Guidelines in manuals clarifying how to convert between parameters as they are defined in the standard and how they are entered/handled in the radio (e.g. PDU addresses)