GSM-R Interoperability - Technical Perspective

Ecaterina Ganga

UIC Conference, Paris
10-11 September 2013

www.gsm-rail.com

Agenda

1. GSM-R Interoperability and benefits for the Railways
2. The GSM-R multivendor InterOperability Testing (IOT)
3. Current GSM-R IOT projects co-financed by the European Commission

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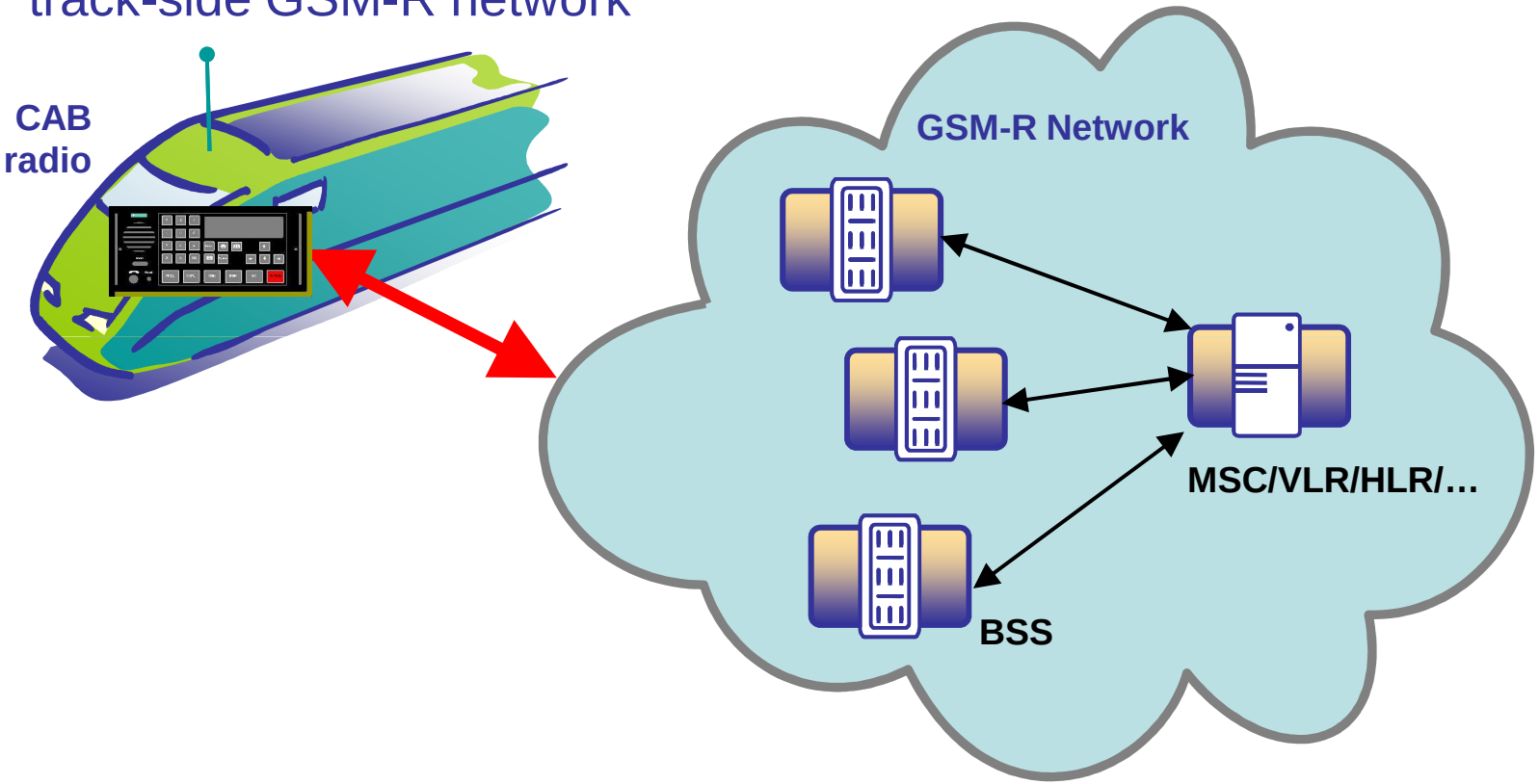
GSM-R Interoperability

Interoperability of on-board GSM-R Cab radio with track-side GSM-R network



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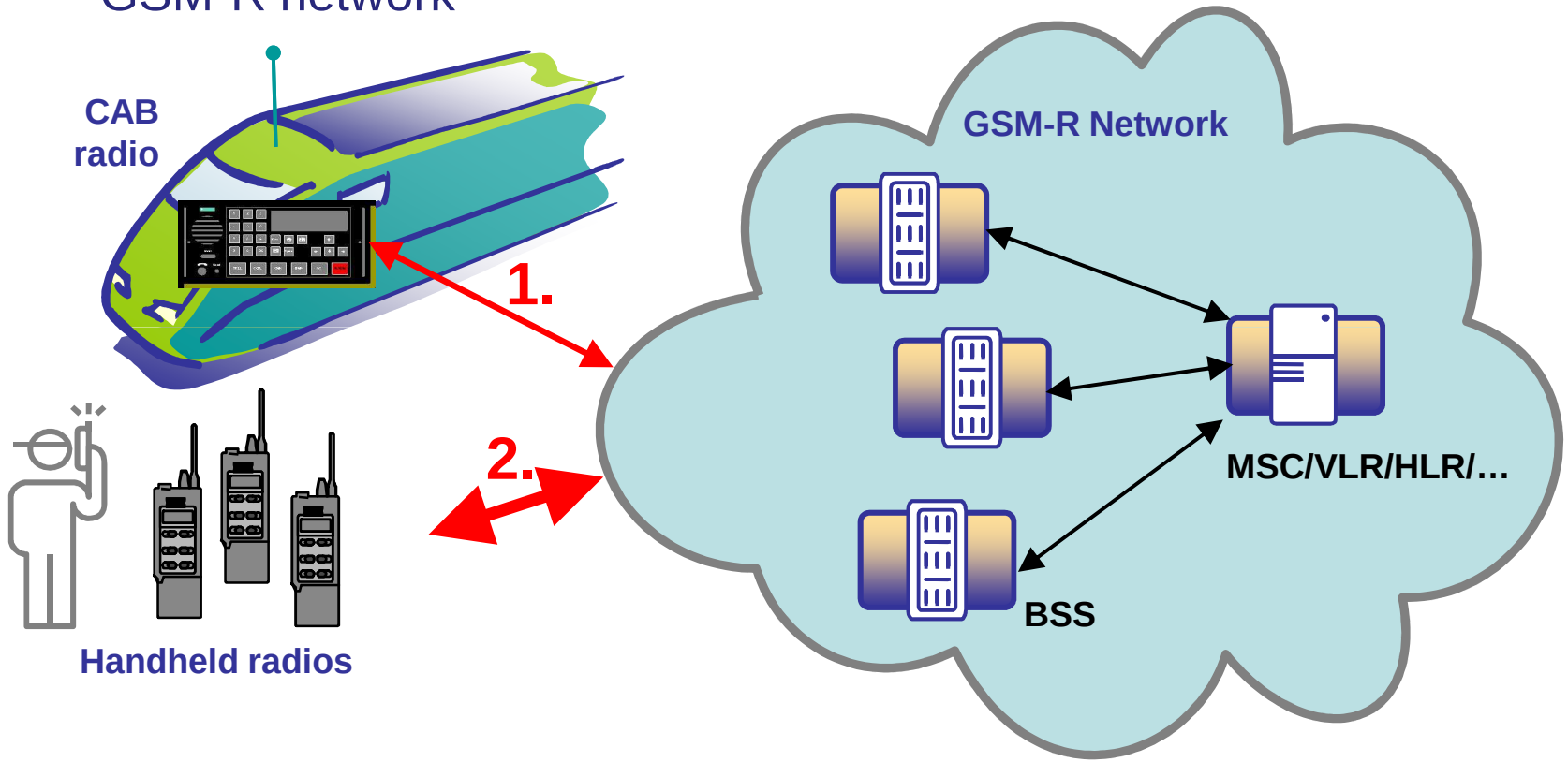
GSM-R Interoperability

Interoperability of Operational & Shunting Handhelds with GSM-R network



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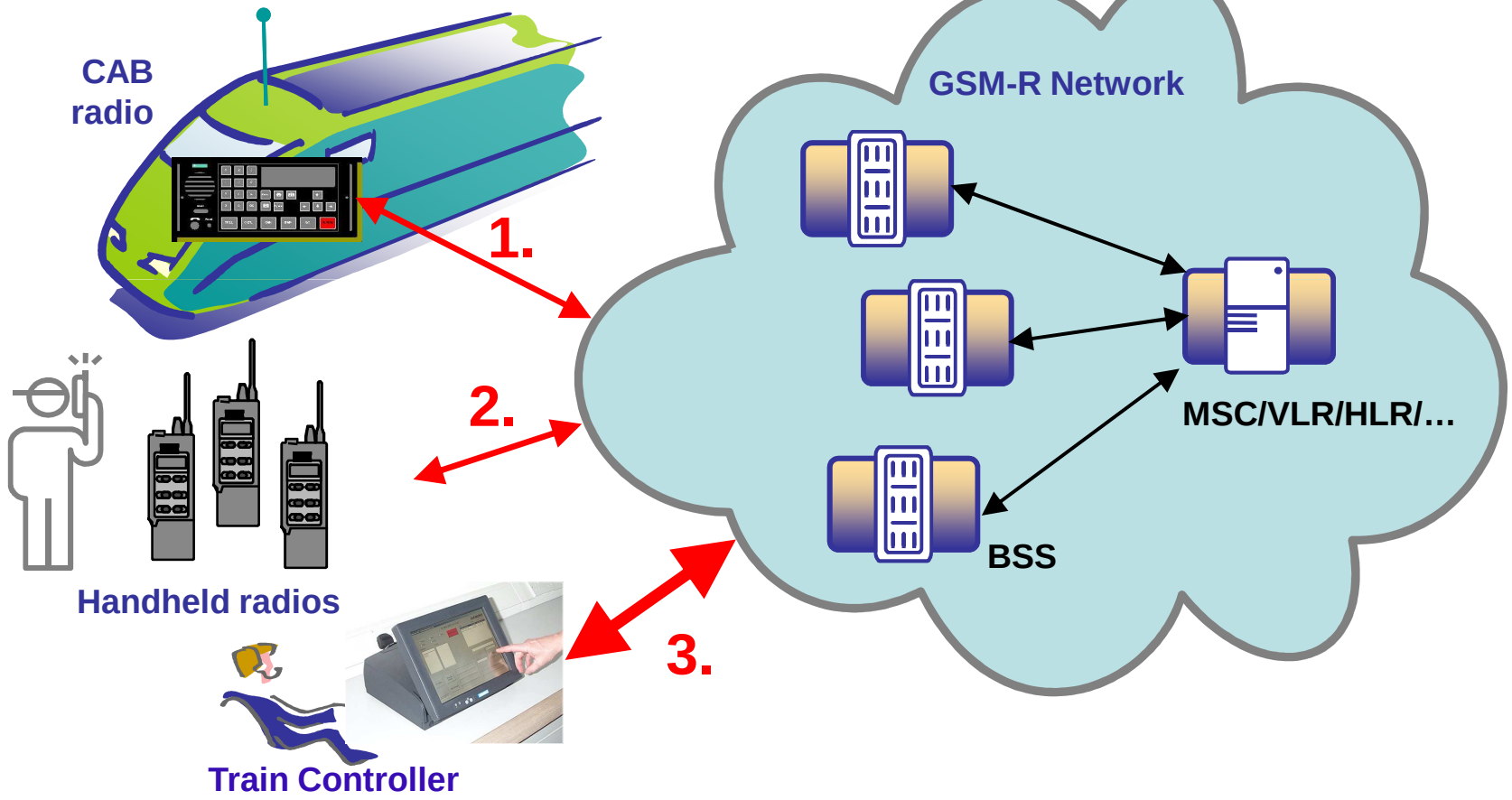
GSM-R Interoperability

Integration of different Train Controller Systems (Dispatcher Systems)



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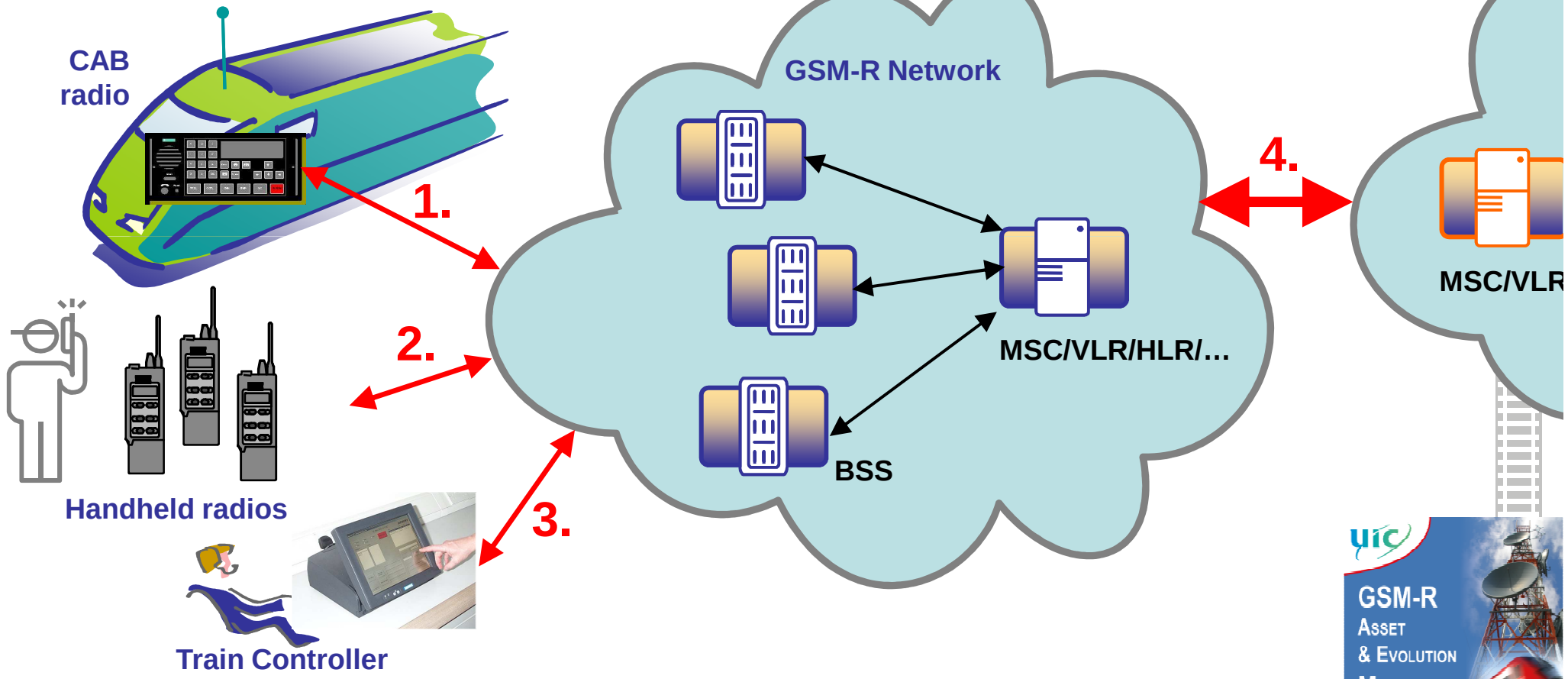
GSM-R Interoperability

Interoperability of interconnected GSM-R networks



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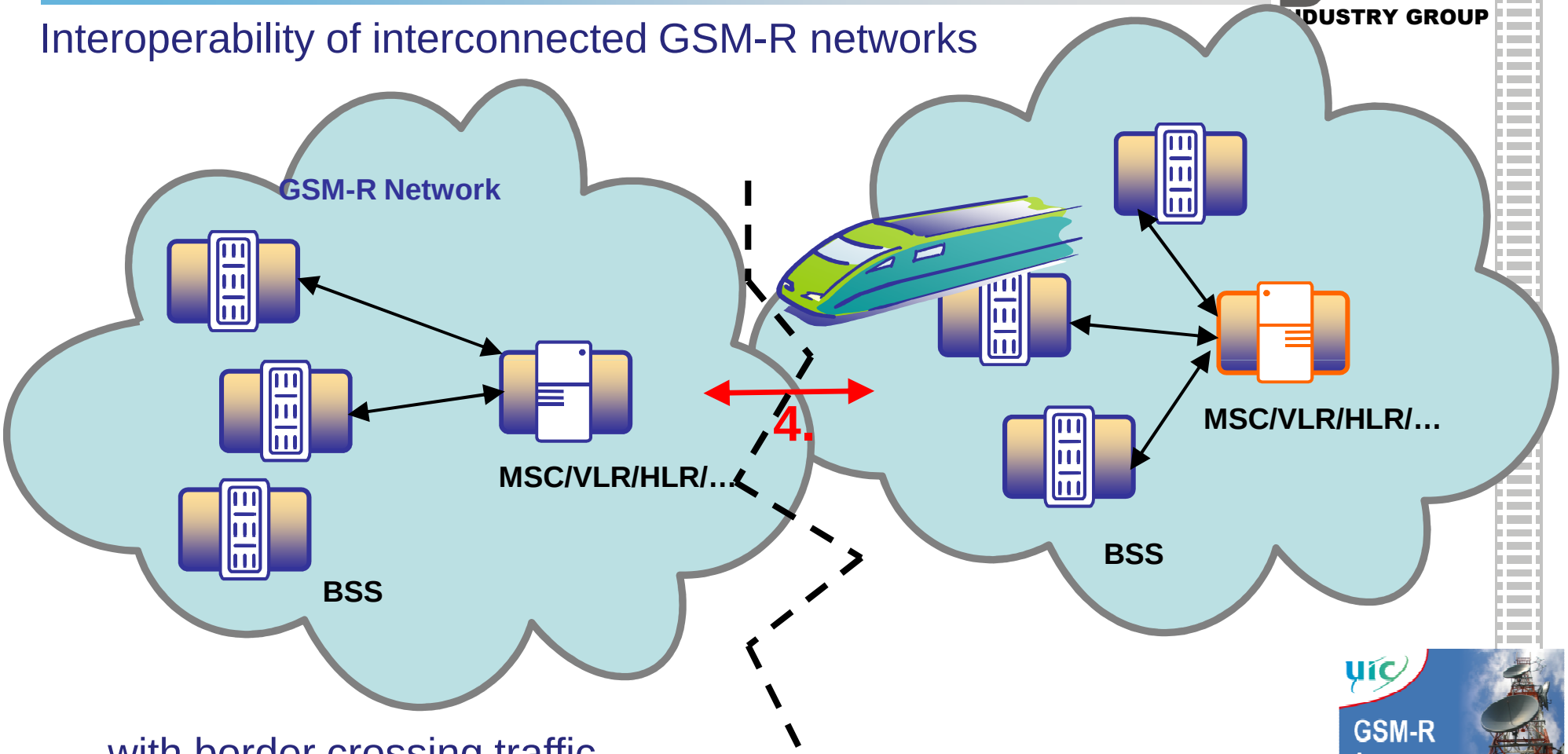
GSM-R Interoperability

Interoperability of interconnected GSM-R networks



… with border crossing traffic

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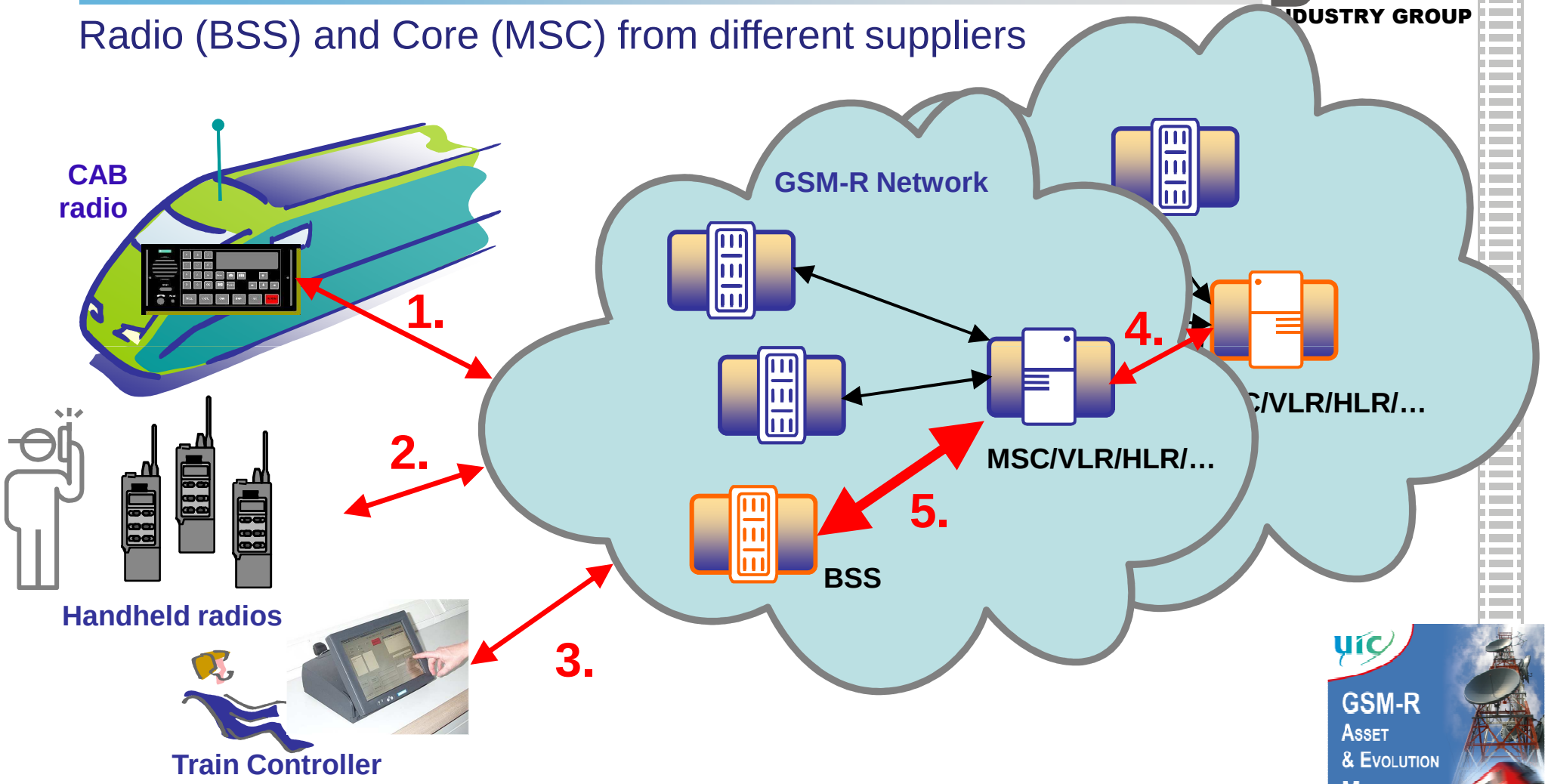
GSM-R Interoperability

Radio (BSS) and Core (MSC) from different suppliers



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ERTMS Memorandum of Understanding

Interoperability testing and Certification

- Initiative by the European Commission
- Signed in Copenhagen on 16 April 2012 by
  - the Commission, CER, EIM, ERFA, UIC, UNIFE (UNISIG) and
  - GSM-R Industry Group
- in 75 paragraphs jointly declare how to move GSM-R and ETCS into a continued, successful future
- Includes **Process Improvements** regarding **Interoperability Testing and Certification** of GSM-R subsystem

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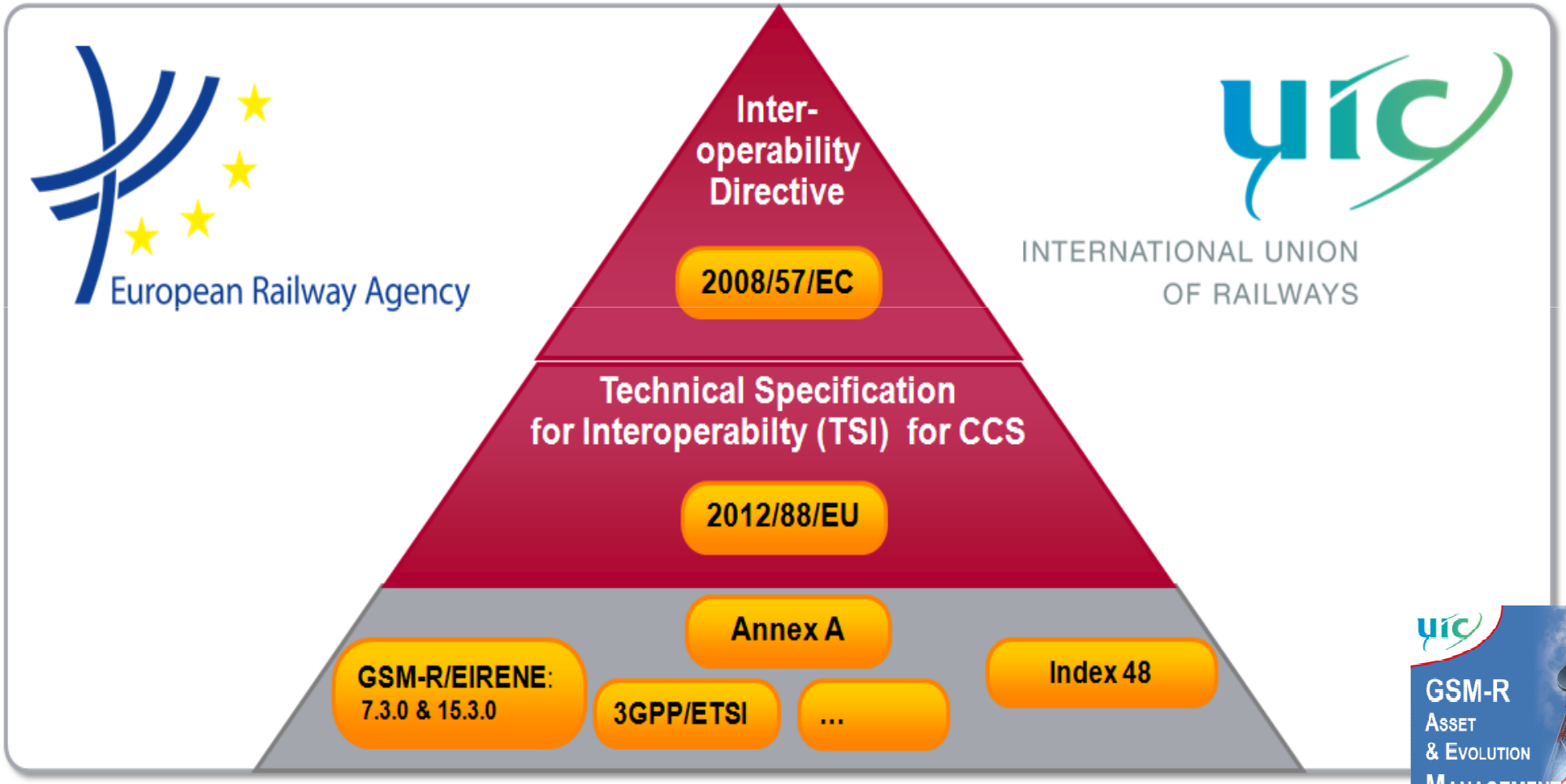
GSM-R Specification

Interoperability requirements



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GSM-R Interoperability testing

Benefits for Railway Operators

- Certification of functionality according to technical specifications
  - …keeping the pace with the technology advances and specifications upgrades
  - …therefore **guaranteed interoperability**, higher quality and reliability
- Cost efficiency for the Railway operators
  - …as interoperability tests are already performed at a global level
- Industry competition
  - …as interoperability tests are performed in multi-vendor configurations

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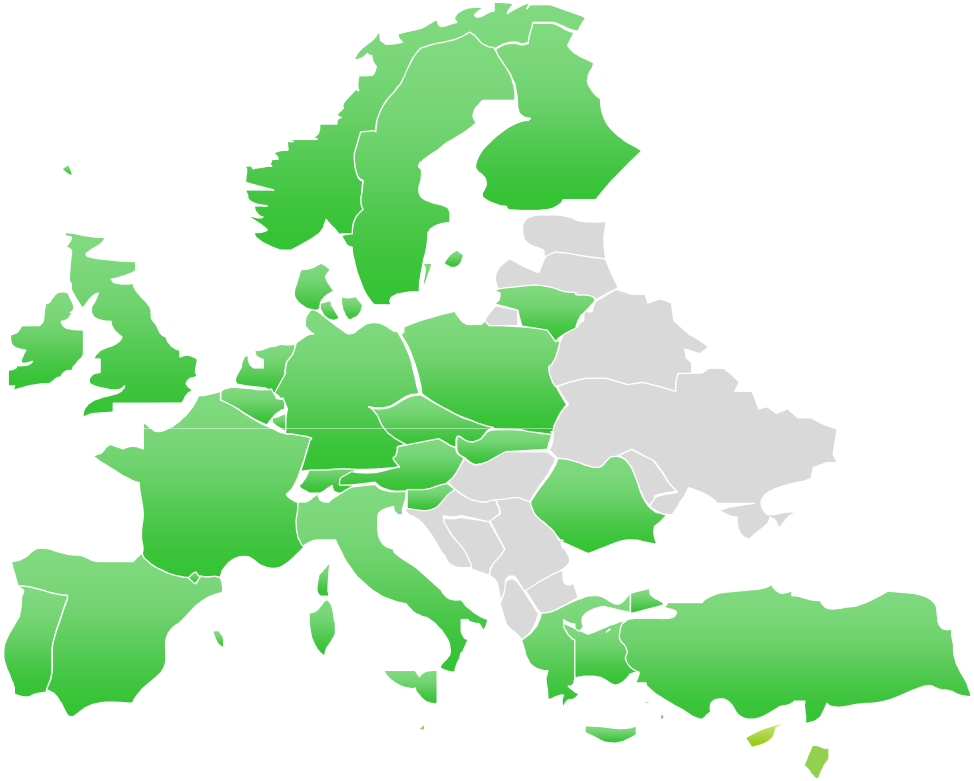
EIRENE Interconnected GSM-R networks



GSM-R Networks

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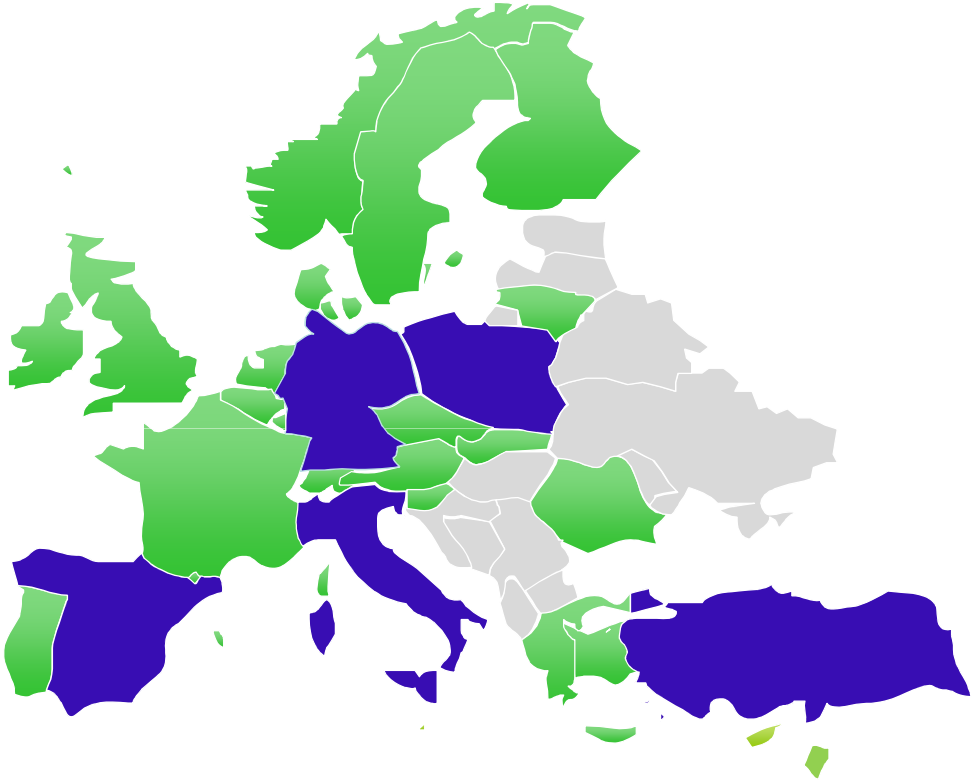
EIRENE multi-vendor (KCC-NSN) interconnected GSM-R networks



GSM-R Networks

Multi-vendor (NSN-KCC) GSM-R networks

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GSM-R multi-vendor InterOperability Testing

Performed regularly by NSN and KCC

- GSM-R InterOperability Testing performed regularly by manufacturers since 2002
- All essential interfaces tested: MSC to MSC and MSC to BSS
- Financing : 50% suppliers and 50% EU

GSM-R Interoperability Testing between NSN and KCC

(supported and co-funded by EU)

EIRENE 5/13
Issued 2000

EIRENE 6/14
Issued 2003

EIRENE 7/15
Issued 2006

EIRENE 7.3.0/15.3.0 7.4.0/15.4.0

Global IOT Phase 1&2
- > Nortel and NSN - NSS/ NSS & NSS/ BSS EIRENE 5/13
- > Static roaming functionality
- > GSM services
- > Advanced Rail services

IOT Phase 3 Initial & Regression
- > NSN and Nortel - NSS/ NSS & NSS/ BSS EIRENE 5/13
- > Inter PLMN connections tested
- > Additional features tested

Global IOT & Field Phase 4.1
- > Nortel BSS to NSN NSS EIRENE 6/14

Global IOT Phase 4.2
- > Nortel NSS to NSN BSS EIRENE 6/14

Global IOT Phase 9.3
- > KCC BSS to NSN NSS EIRENE 7/15

Global IOT Phase 9.2
- > KCC NSS to NSN BSS EIRENE 7/15

Global IOT Phase 9.1
- > KCC NSS to NSN EIRENE 7/15NSS

Global IOT Phase X
- > GSM-R NSS/ NSS & NSS/ BSS & E2E
- >GPRS
- >QoS
- >Validation of Test Specs

IOT Phase 3 extension
- > Focus on additional features (late entry, eMLPP, Call barring and Access Matrix, Class of Registration, …)

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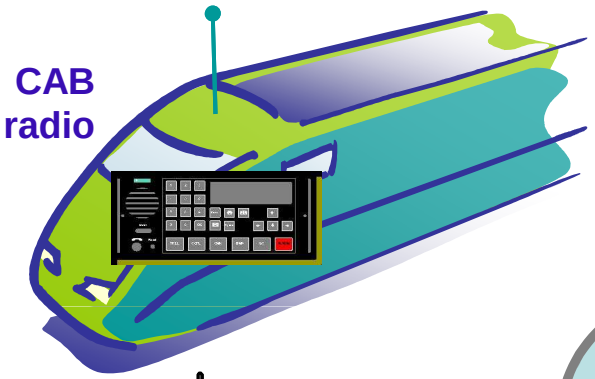
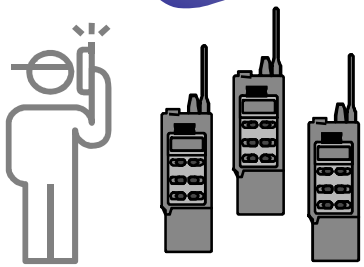
Radio (BSS) and Core (MSC) from two different suppliers: KCC and NSN

Essential tested Interfaces

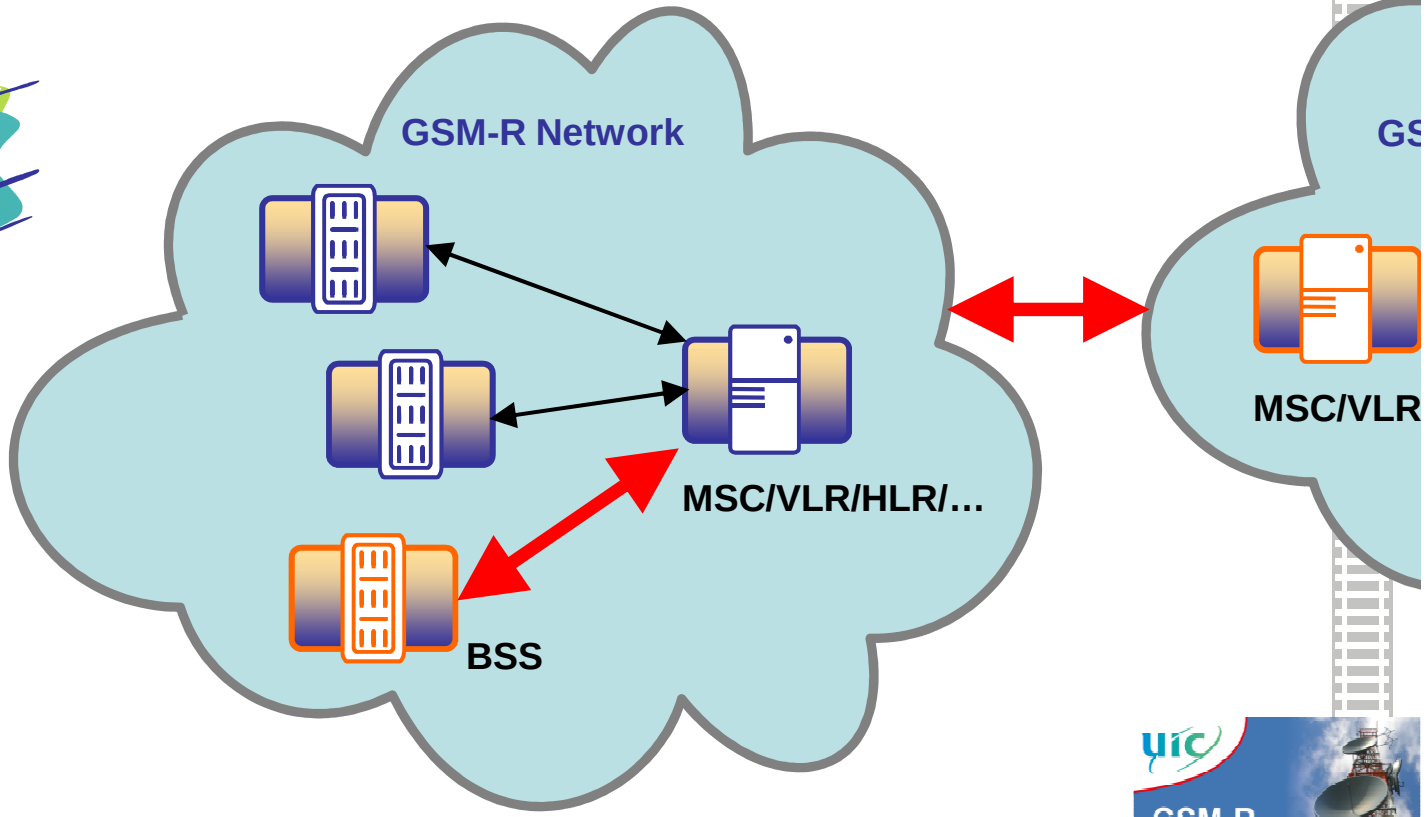


CAB radio



Handheld radios

Train Controller



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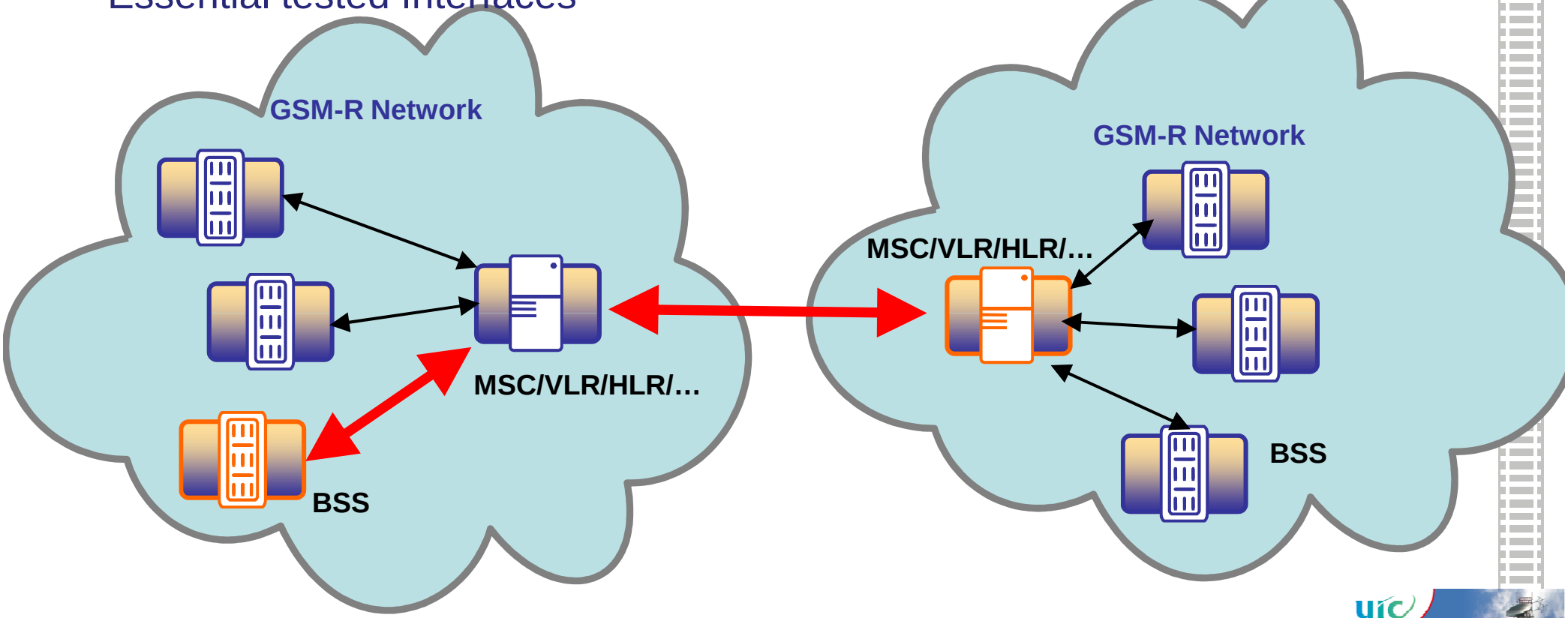
Essential tested Interfaces



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Latest completed EU funding program

TEN MAP 1st Call until end 2011

- IOT campaign NSN - KCC based on EIRENE 7/15 during 2011
  - NSN Core (R99) interconnected with KCC Core (R4)
  - NSN Core (R99) interconnected with KCC BSS
  - NSN BSS interconnected with KCC Core (R4)
- Reports were approved by ERA
- Joint NSN and KCC IOT Declaration “To whom it may concern” dated May 2012 about the successful outcome of all three phases has been issued
- Publication of test plans and results on ERA web site

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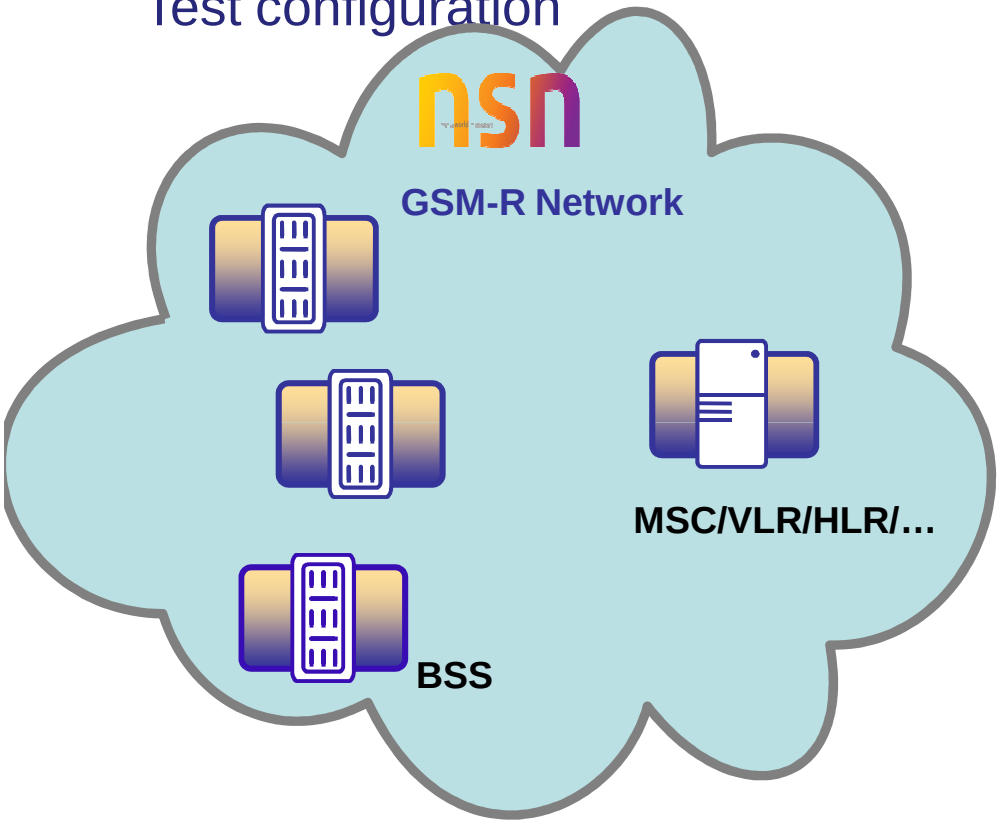
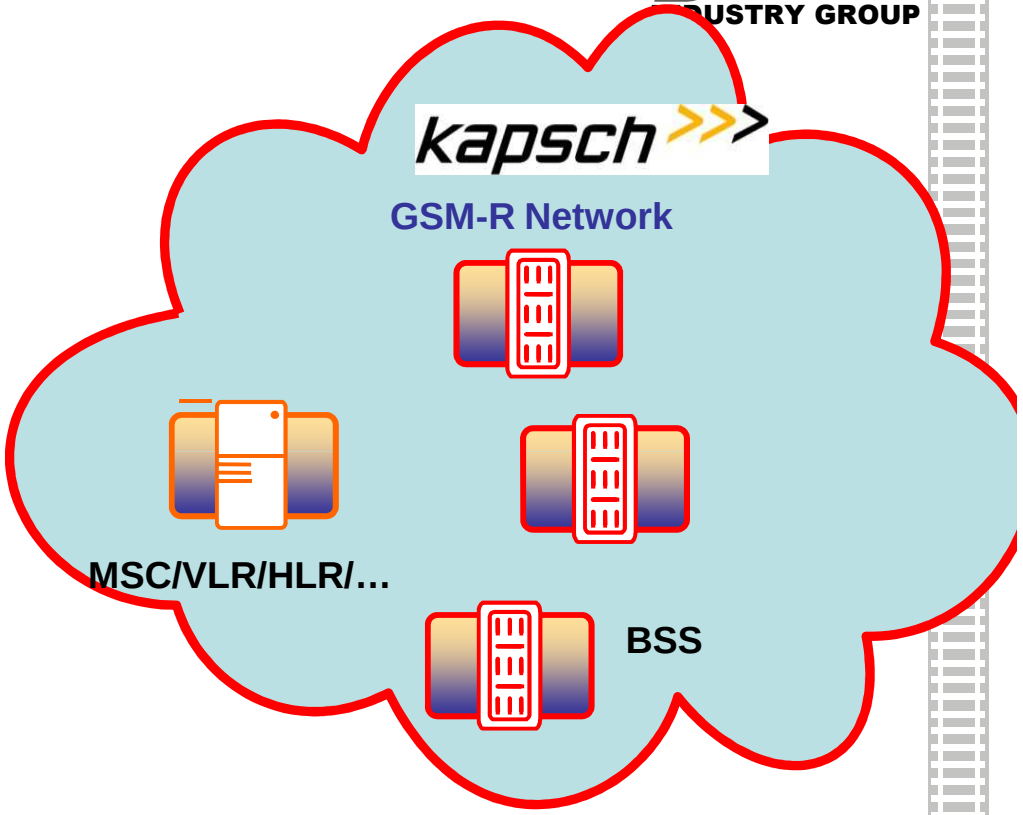
IOT campaign NSN - KCC based on EIRENE 7/15 during 2011

Test configuration





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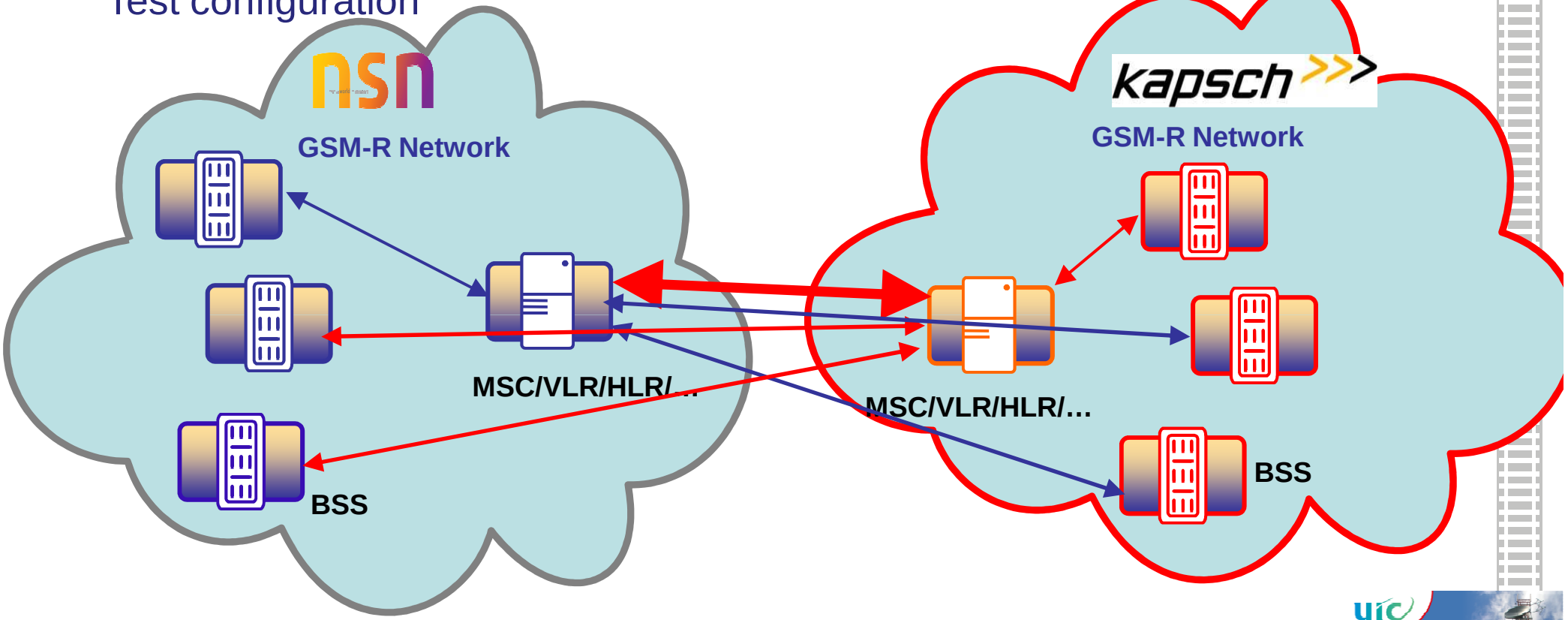
IOT campaign NSN - KCC based on EIRENE 7/15 during 2011

Test configuration



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Current EU funding program

TEN MAP 3rd Call until end 2014

- Action Nº 2011-EU-60013-S : “Facilitating and speeding up ERTMS deployment”, timeframe 2011-2014
- Validation of ERA test specs for GSM-R network interoperability assessment (WP5)
- Continued GSM-R InterOperability/Compatibility Testing IOT (WP10)
  - CAB /EDOR e2e testing
  - EIRENE 7.4.0/15.4.0
- ETCS over GPRS (WP9)

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Validation of ERA test specification for GSM-R network interoperability assesment (WP5)

2013

- Test specification for the certification of the GSM-R infrastructure
  … to be included in the Application Guide from ERA
- Lab testing of the selected test cases
  … performed by KCC and NSN with ERA supervision
  … to verify that they are proving the “Mandatory for Interoperability” requirements of the EIRENE specification and that they can be executed
- …will bring the benefit of a **certified test specification for GSM-R** equipment:
  - a guide for the tests to be performed by the Notified Bodies to prove the GSM-R equipment **interoperability**
  - will guarantee continued and improved GSM-R interoperability c

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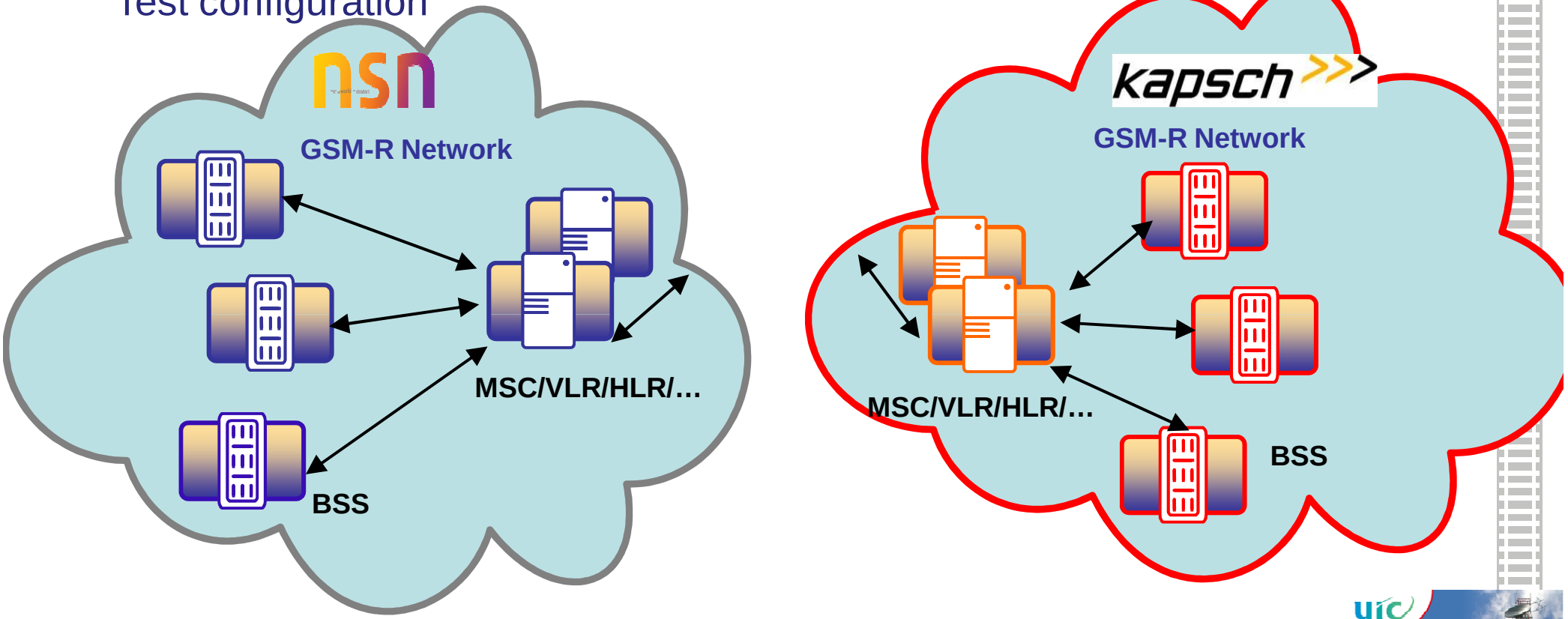
Validation of ERA test specification for GSM-R network interoperability assesment

Test configuration



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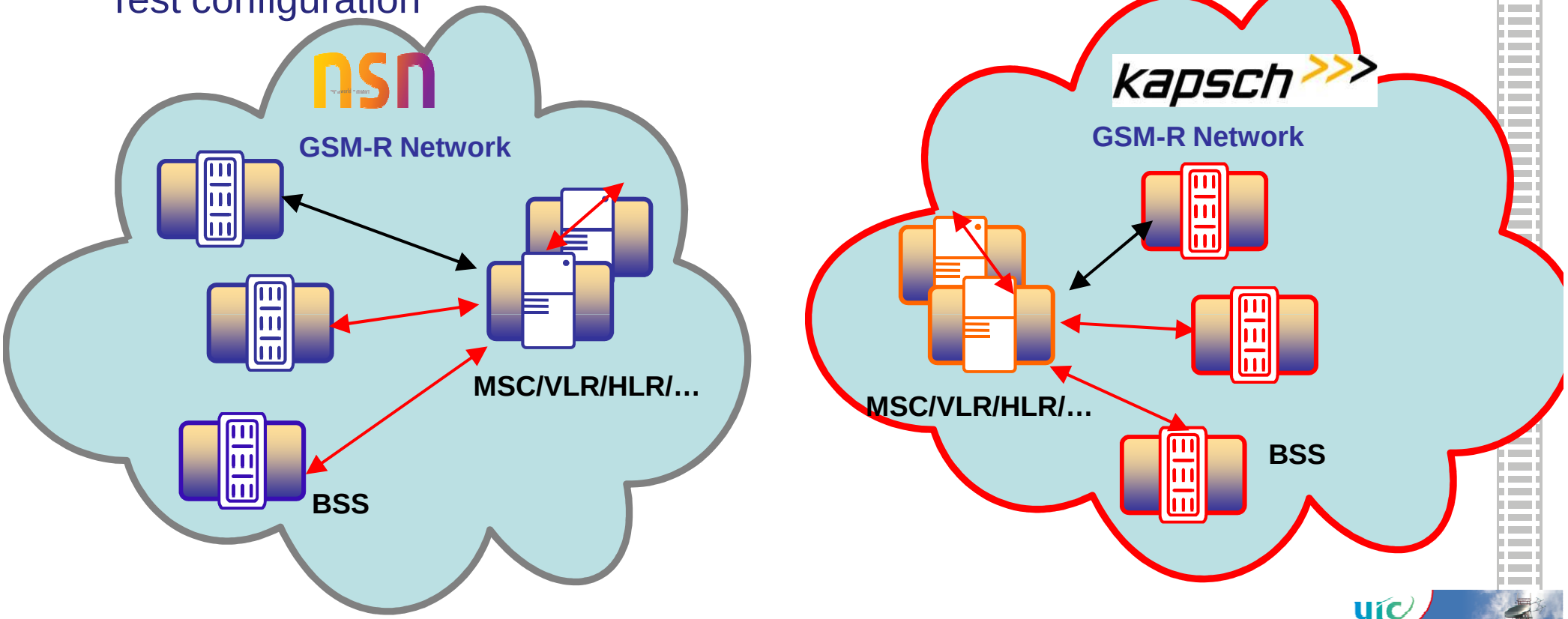

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GSM-R interoperability testing for upcoming EIRENE 7.4.0/15.4.0 specification (WP10)

2014

- Test of GSM-R Infrastructure
  - …to validate the network elements Interoperability
  - …will prove that the networks supplied by the two vendors NSN and KCC are compatible and support the GSM-R functionality specified as mandatory for interoperability
  - …test activities will verify all the relevant interfaces: MSC to MSC and BSS to MSC
- Test of GSM-R Cab Radios
  - …to validate end-to-end functionality and interoperability with track side

ALSTOM

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traffic & control communication

kapsch

nsn

Selex ES
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Thank you