LTE for critical communications in rail. How and when?

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Ancient History *

* in telecoms terms

between expectations and reality

Structure

- Critical communications/public safety communications evolution outside rail
- Applicability to rail
- Rail industry actions

Commercial cellular

Benefits of vast success:

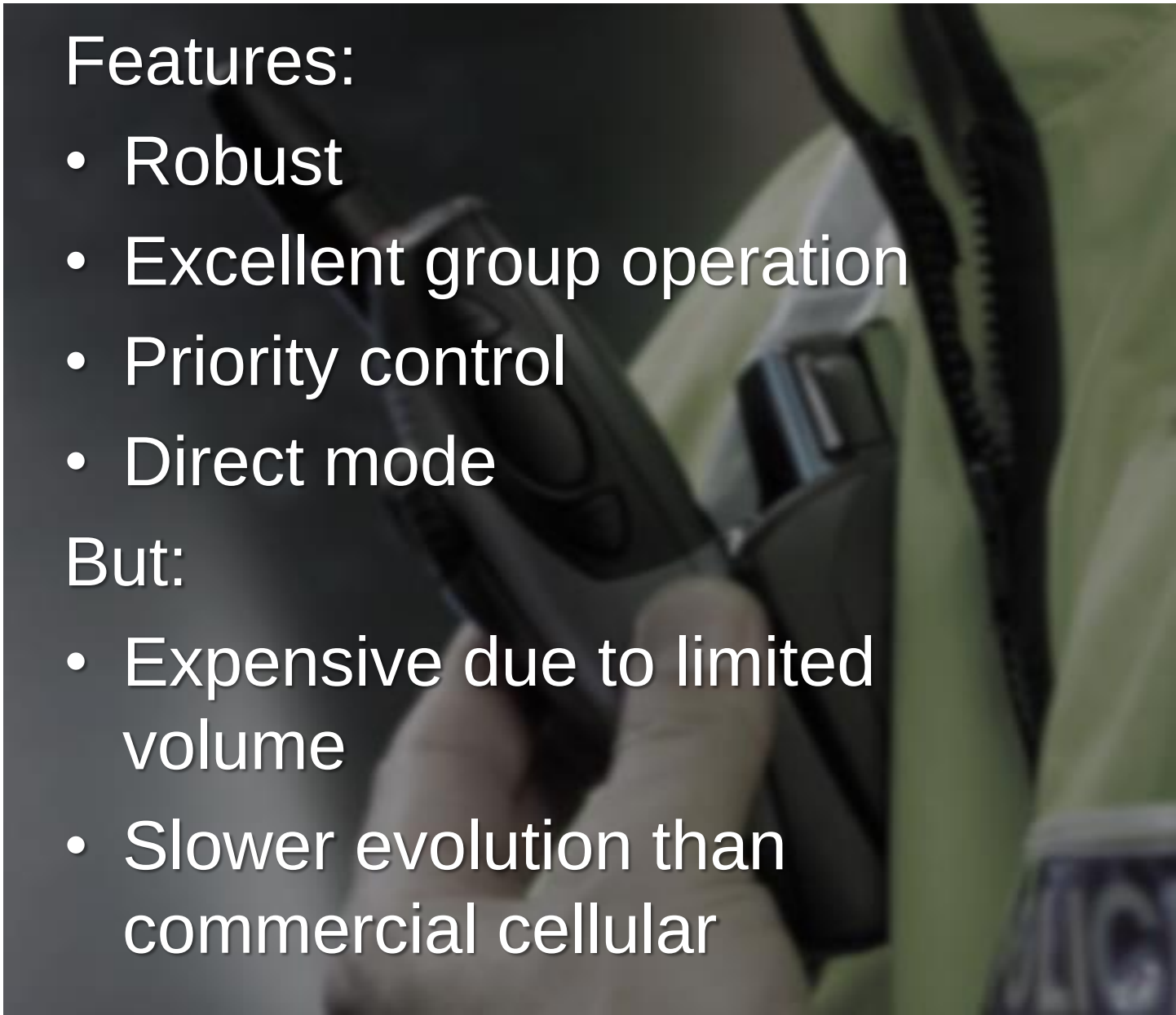
- Huge R&D investment and innovation
- Network capacity
- High speed, multimedia

But:

- Not optimized for critical communications
- (Generally) no strong coverage obligations

Image: Sascha Pohflepp

Critical communications



Features:

- Robust
- Excellent group operation
- Priority control
- Direct mode

But:

- Expensive due to limited volume
- Slower evolution than commercial cellular

..etc…

Vision

Critical Communications

Rail Critical Comms?

Consumer

Commercial

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Commitment to LTE

National Public Safety Telecommunications Council

Spectrum and US$7bn funding for national US public safety network at 700MHz

Started standards process in 3GPP

Tetra + Critical Communications Association

Committed to LTE for broadband critical communication systems

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Public safety scope in 3GPP

System Features

Proximity services (ProSE)

Group call on LTE enablers (GCSE_LTE)

Radio Layer Features

Frequency band/Power support

High speed rail support

Radio enablers for system features

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Proximity services

- Devices in close proximity communicate directly

- Reduce network load
- Increase radio efficiency

Coach – Coach
Shunting, Depots

- Communication in areas without network coverage

Critical communication only

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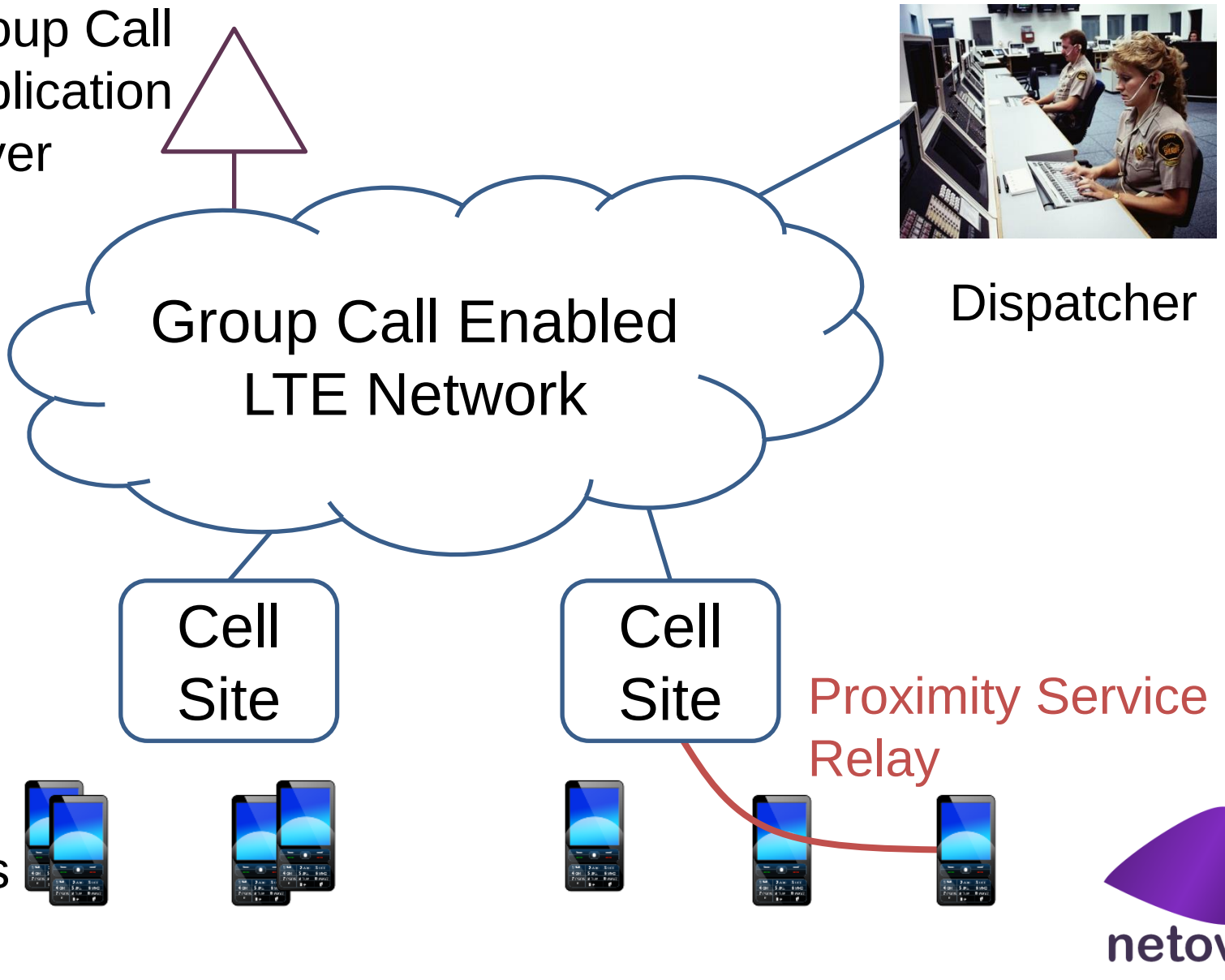
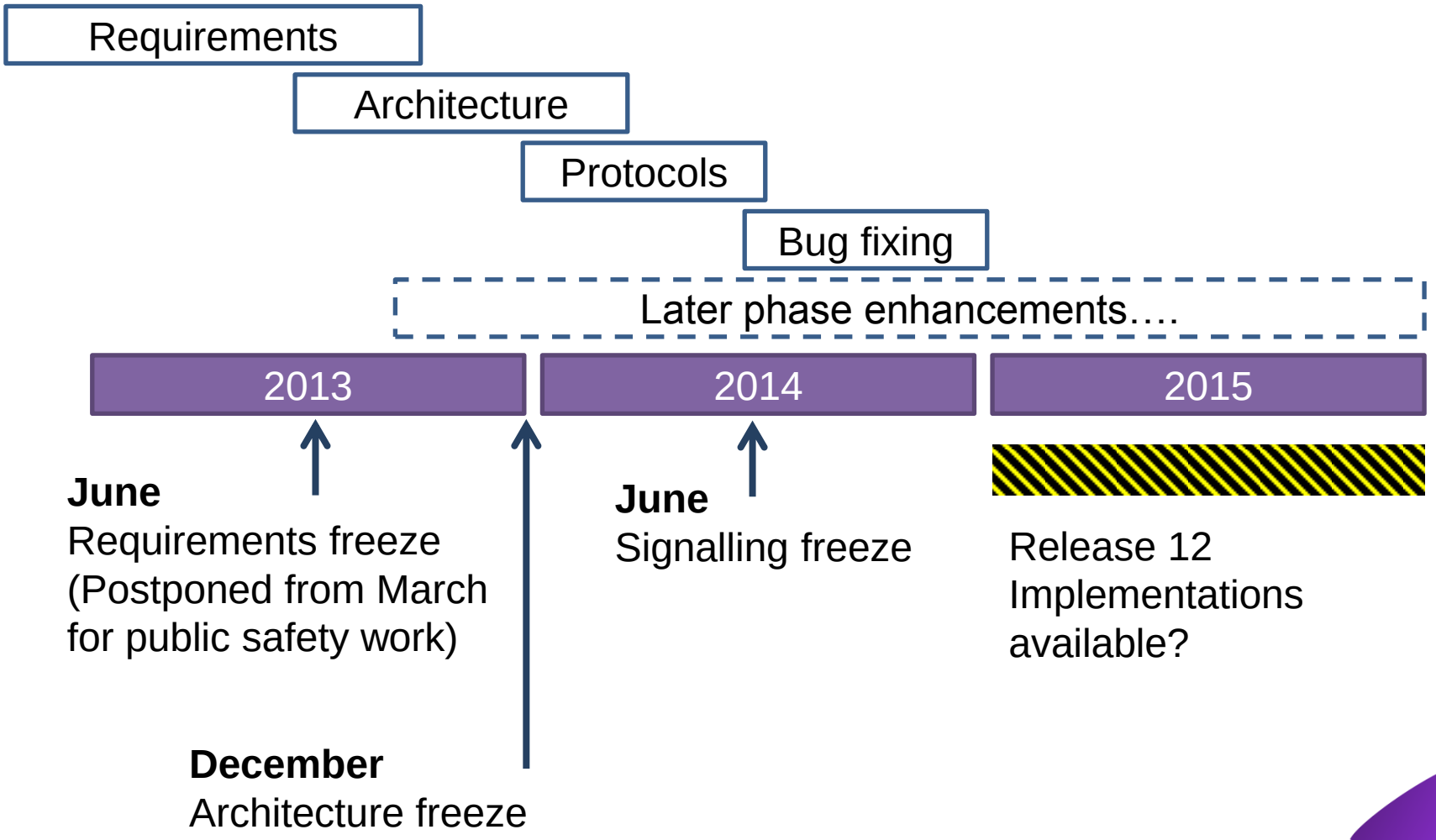
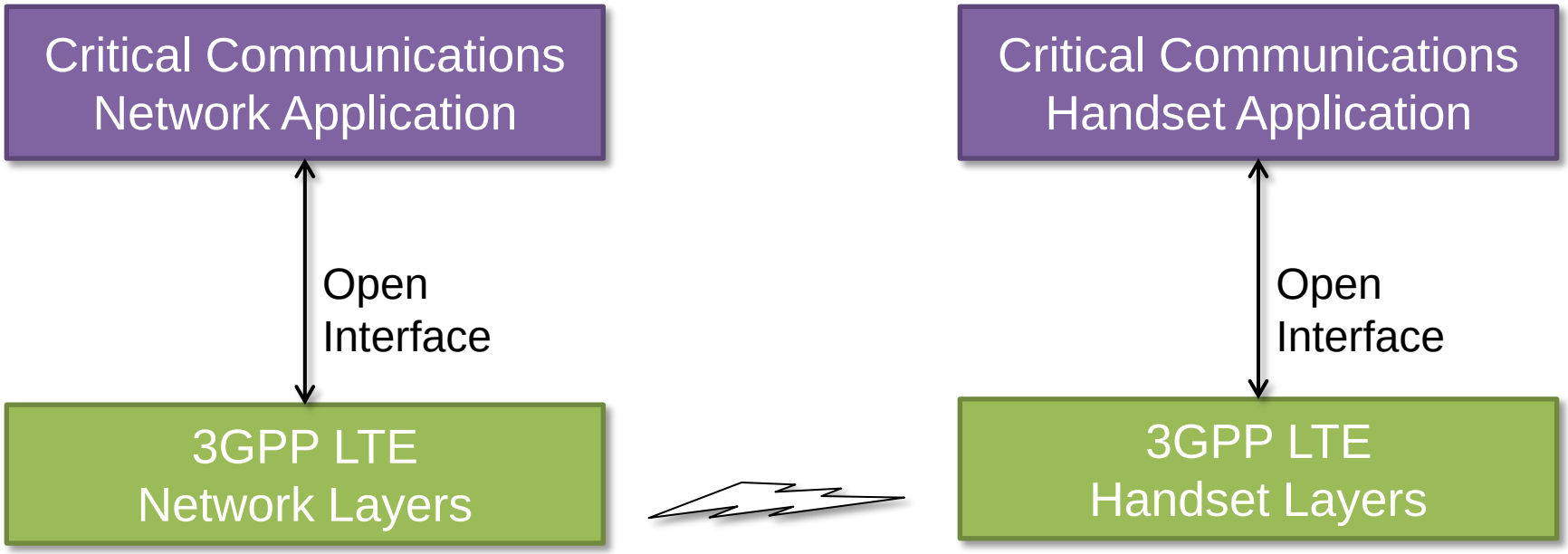
Group calling enablers



3GPP Release 12 roadmap



Application/enabler split



Looks familiar?!

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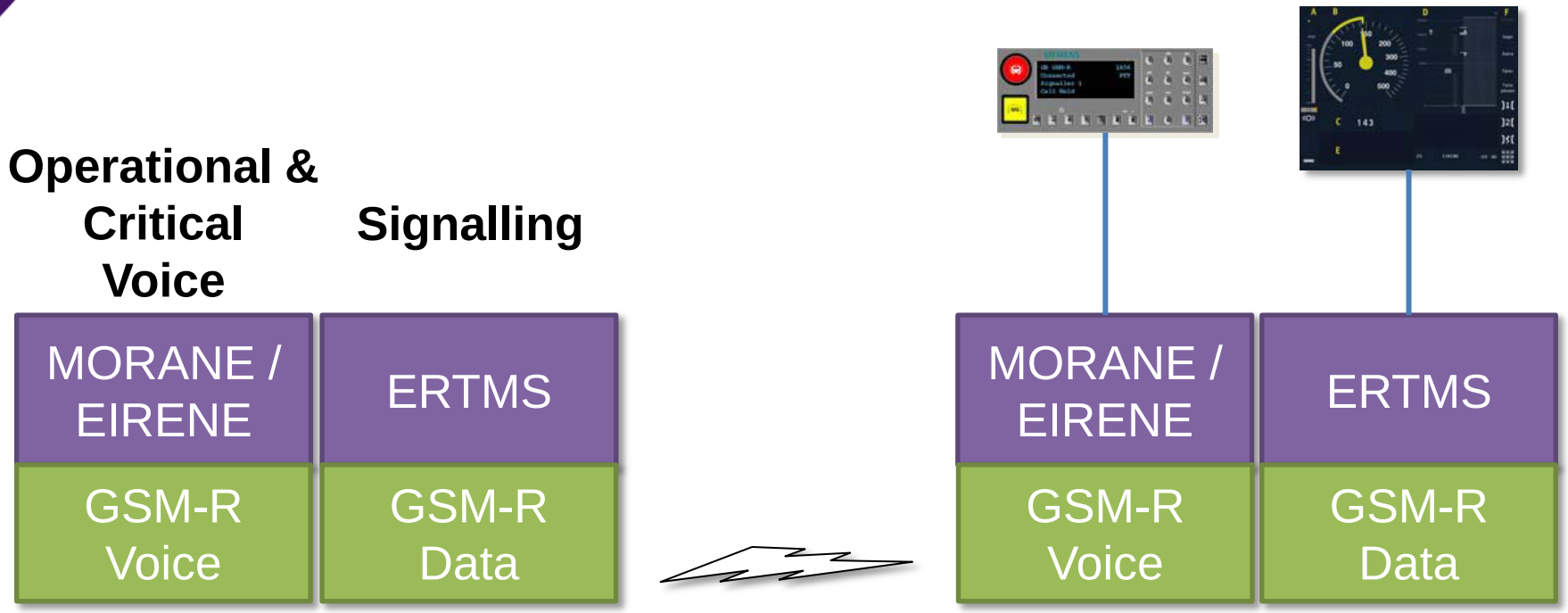
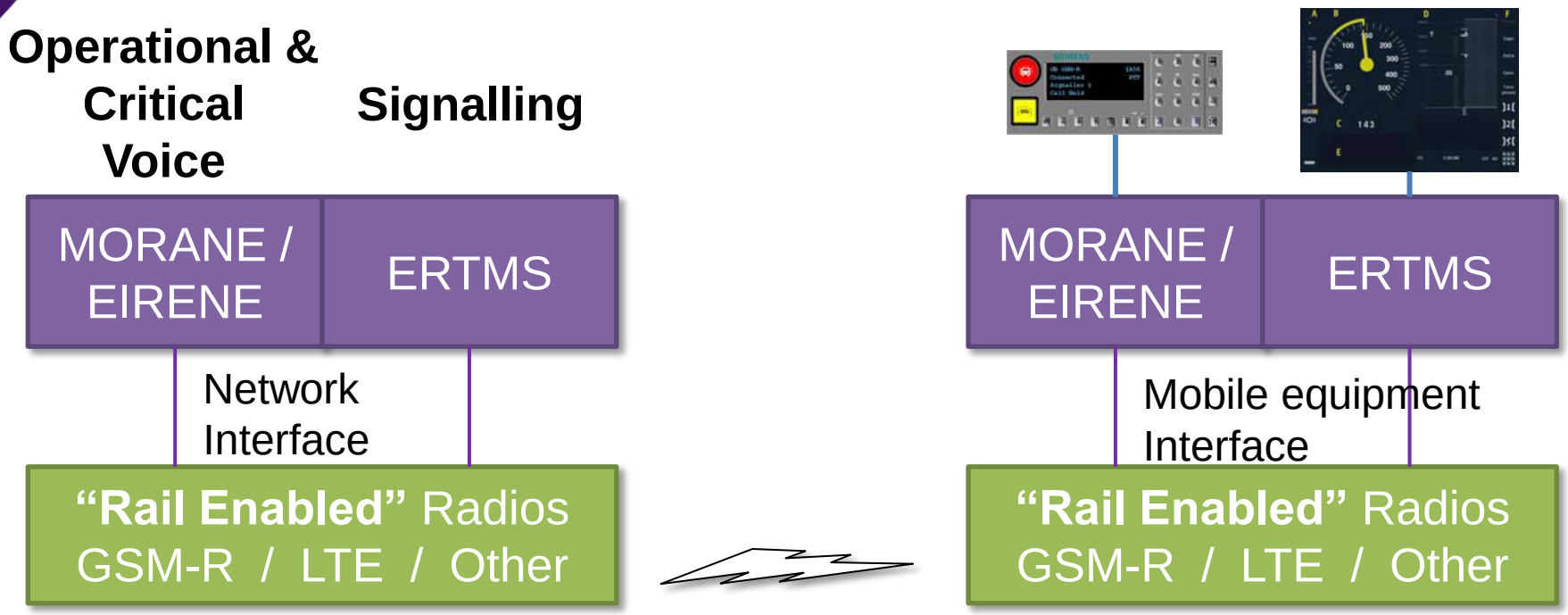
GSM-R/ERTMS architecture



- Interface is implicit and GSM-R dependent

Open architecture



- Technically viable
- Derisk future radio technology changes
- Enables common platform for safety critical and non safety critical apps

What is a rail enabled radio?

	Voice	Data
Group calling	Yes	
Functional addressing platform	Yes	
Direct mode	Yes	?
High speed train support	Yes	Yes
Priority services	Yes	Yes

In other words, the LTE critical communications requirements!

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Transition triggers

- Spectrum
- Regulation
- Product end of life
- New build
- Critical broadband apps (CCTV)

Beyond our control

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Use commercial networks

NOT REAL!

BUT

- Open interfaces decouple apps from infrastructure
  - Don’t need dedicated radio network
- Lots of questions arise
- Utilizes 3rd party spectrum

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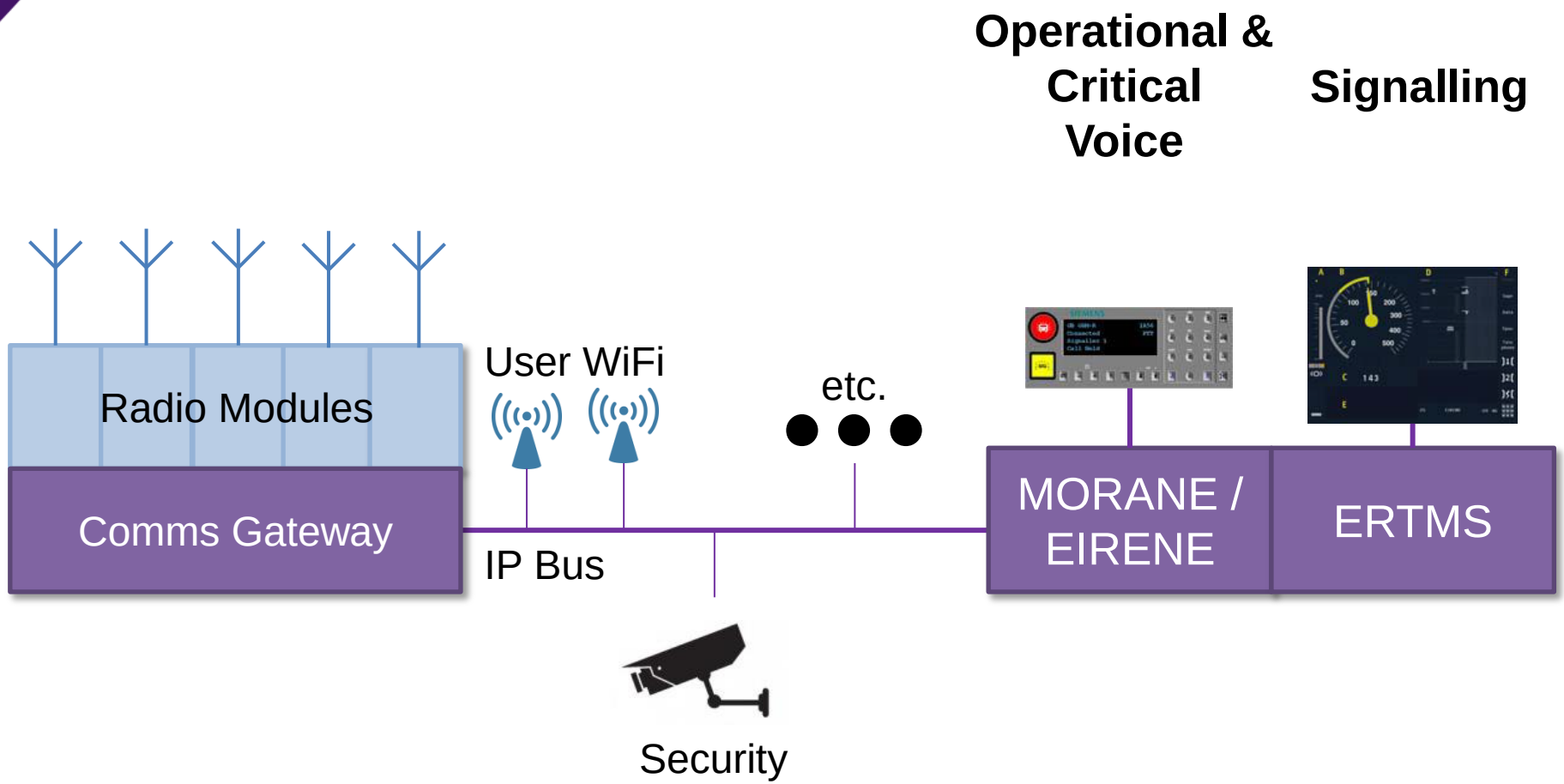
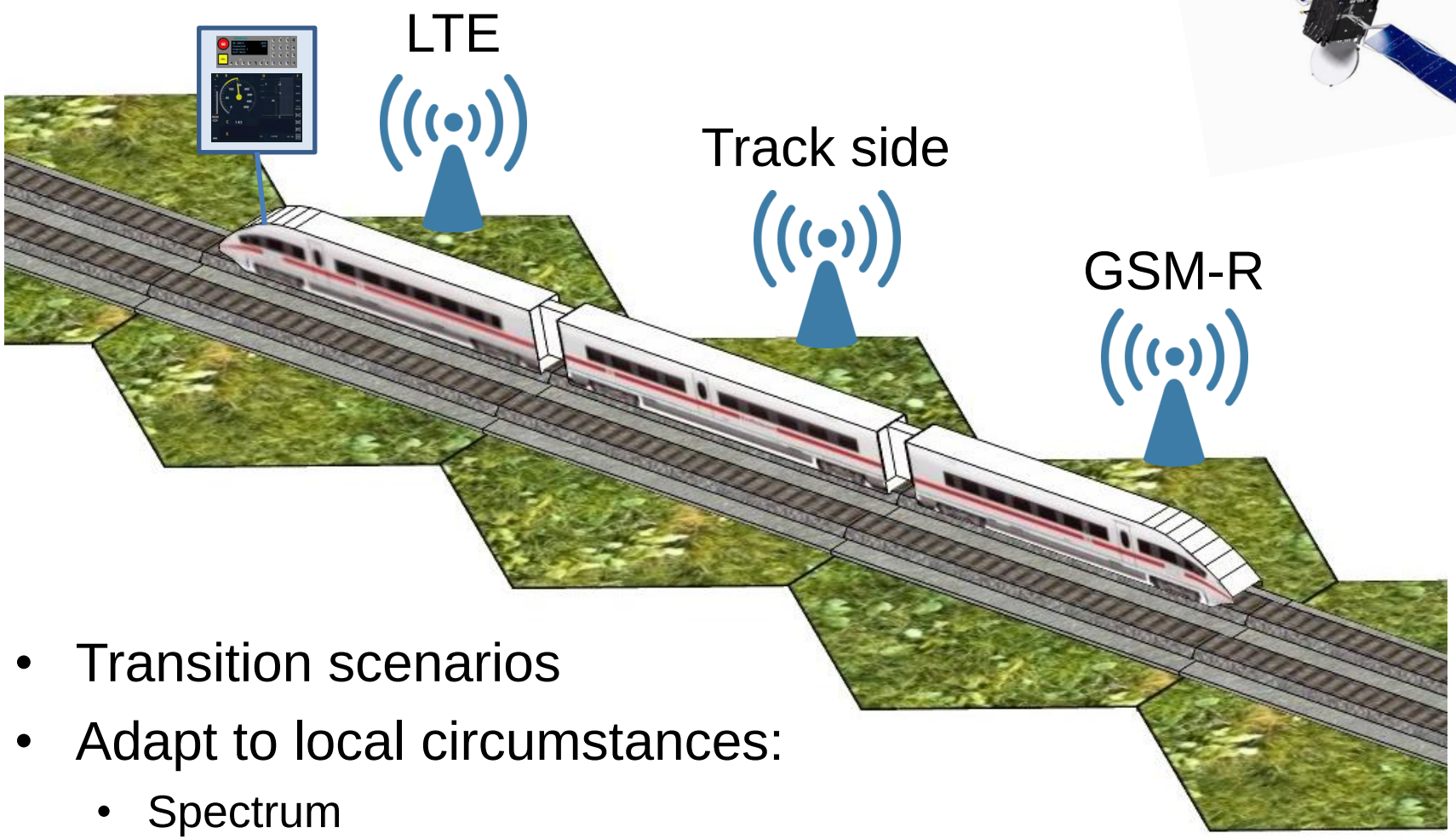
On train system



Critical comms, multi radio



- Transition scenarios
- Adapt to local circumstances:
  - Spectrum
  - Physical geography
  - Human geography

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Rail industry actions

- Not ready to influence LTE technology
- Define GSM-R lifecycle: regionally, nationally
  - Given realistic spectrum assumptions
- Understand what LTE can deliver for operational/critical communications
- Evaluate commercial networks use

Take away

- LTE standards for critical communications also enable GSM-R like applications
  - Becoming available from 2014….
- Decoupling applications from radio network infrastructure is technically desirable
- GSM-R is not forever!

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More information

- www.3gpp.org/Public-Safety
- Netovate training event in December, See: netovate.com

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- Cellular applications consultancy
- Training