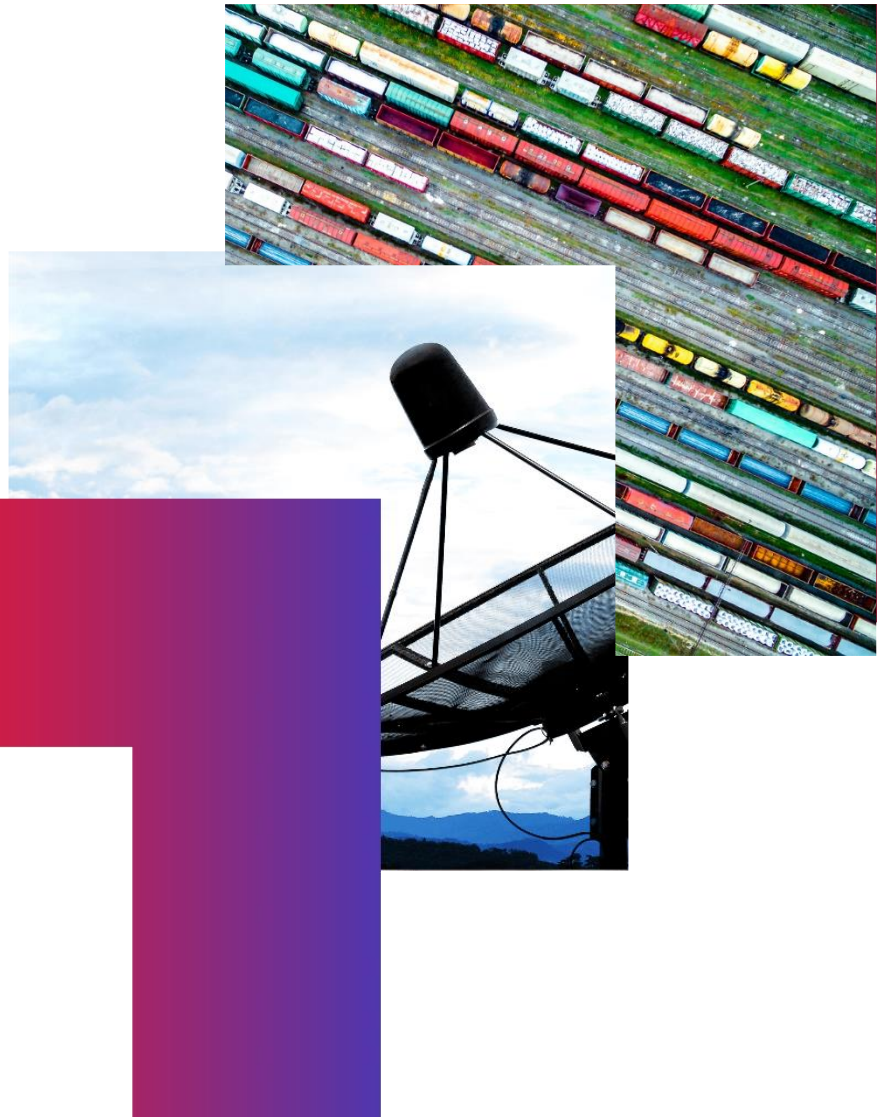
SODOR



Gareth Hartwell, Director Consulting Services, Satcoms for Transport

CGI

Agenda

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CGI in Space

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Mobile broadband context

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Parallels to the airline challenges and next steps

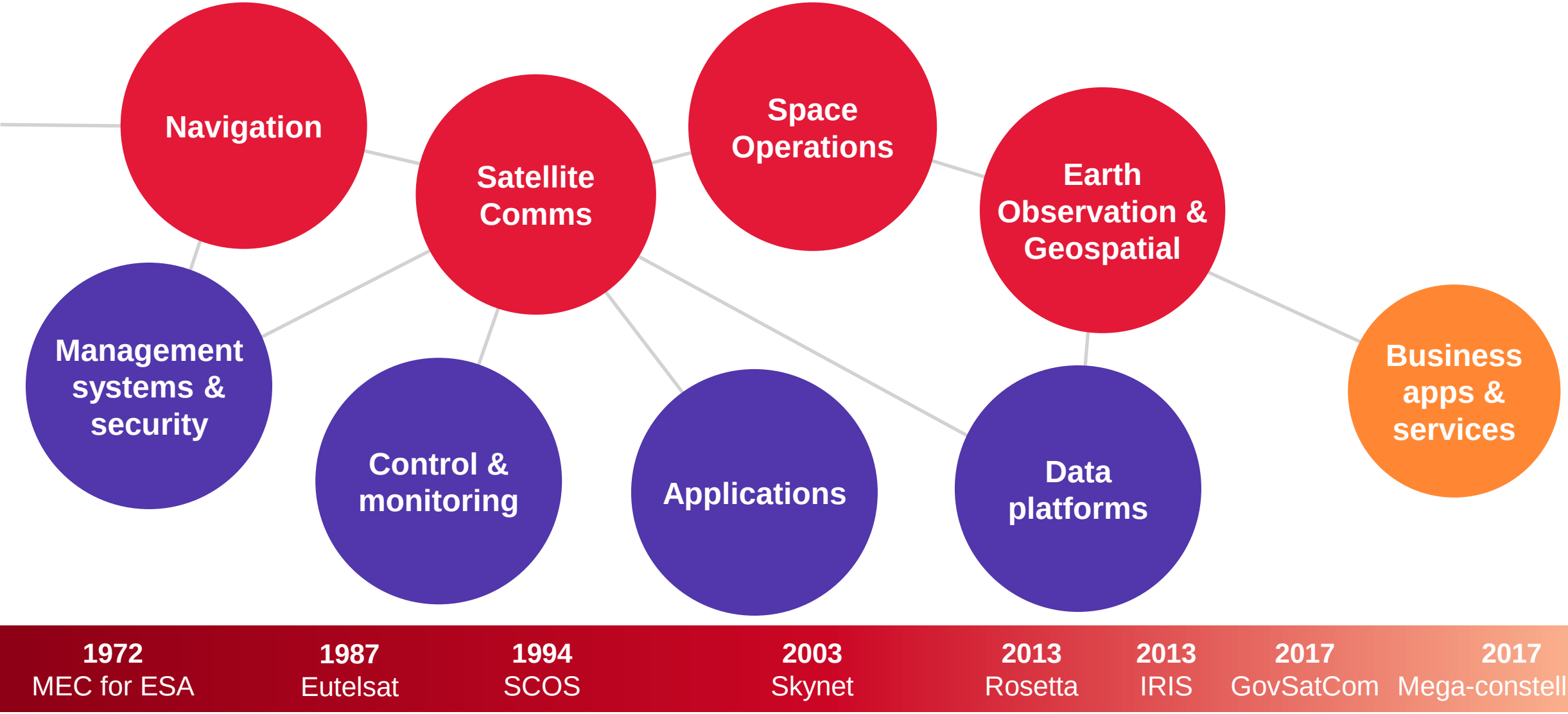
Introducing Gareth Hartwell

Gareth has over 25 years' experience in the fields of satellite and terrestrial communications leading programmes for CGI and previously at a leading terrestrial mobile supplier.

He is currently leading the SODOR project and is also responsible for CGI's role in ESA's Iris programme.

Gareth about to try – and fail – to use the onboard Wifi on the Amtrack service from Boston to New York in 2018

CGI - Delivering mission-critical solutions in Space for 47 years



Ubiquitous mobile broadband

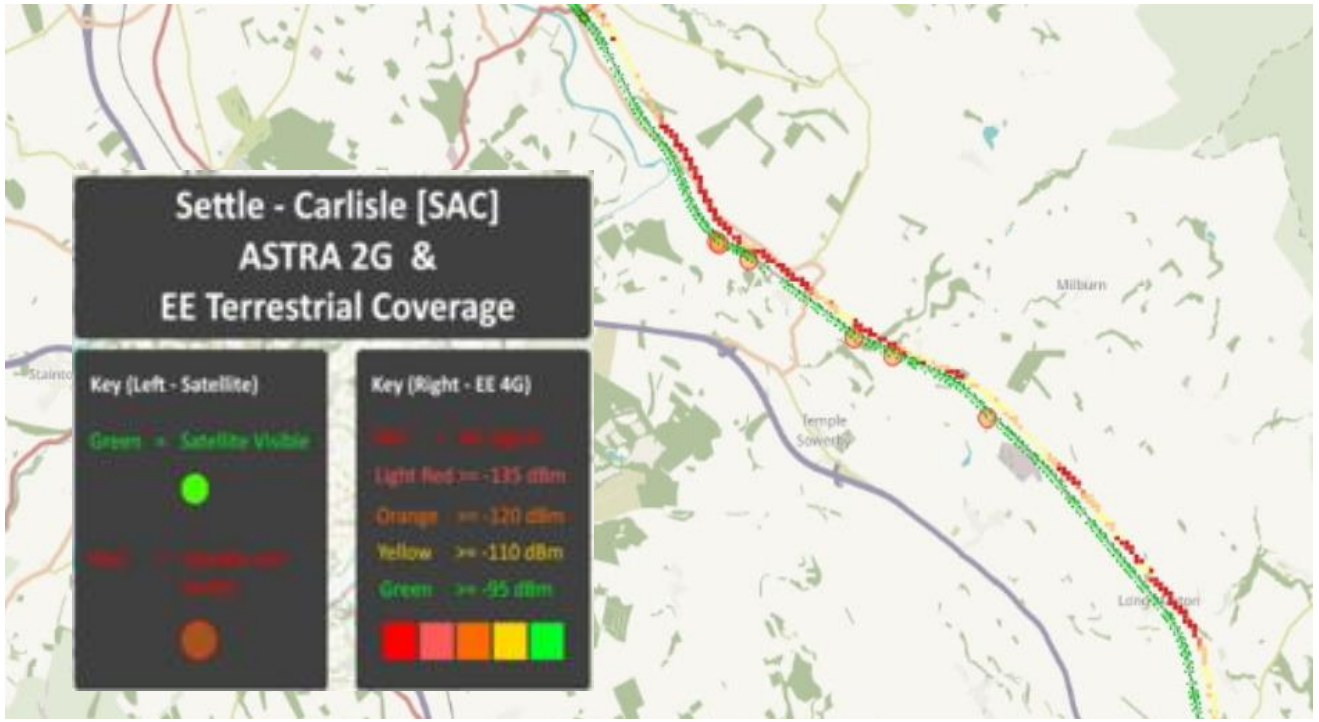
But what about on a train?

- Users expect a similar service despite
  - Poor rural coverage
  - Attenuation due to train carriage, trackside vegetation etc.

- After Stonehaven crash last year, lack of terrestrial mobile signal impacted drivers and hindered emergency response

Wifi on Trains

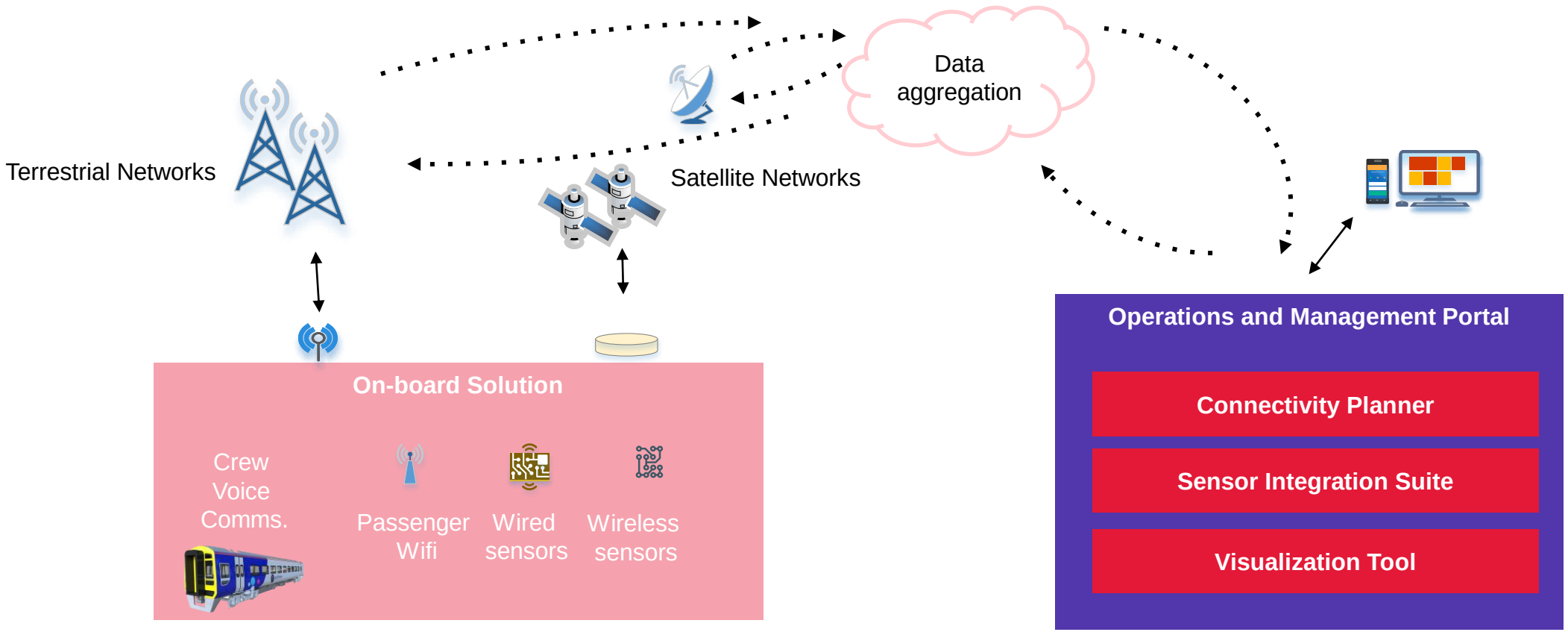
- To overcome these issues most train operators provide onboard Wifi:
  - But still usually relies on terrestrial mobile coverage which can be very poor in rural areas:



- Pure satellite services trialled also have had issues:
  - Cost of satellite bandwidth
  - Line of sight issues – especially in high latitudes - due to cuttings and vegetation

Hybrid Solution

- Through use of a hybrid solution utilising both 5G terrestrial and satellite networks (GEO and LEO), the best service possible can be obtained at the lowest cost
  - Enabled via intelligent connectivity planning in advance for each route



The SODOR Project

- CGI are leading a consortium to demonstrate the hybrid concept (co-funded by ESA)
  - Partners include the UK rail authority and three UK Train Operating Companies
  - Use cases delivered by a combination of low and high bit rate solutions:
    - Near-Real Time IOT via SatCom
      - Ride quality sensing, train location, CCTV
    - On-board broadband
      - Passenger WiFi, driver voice and data communications

How SODOR Meets The Challenge

	Why SODOR?	Resulting benefit?
Reduce operational costs	Compatibility with 5G networks minimising use of satellite link	Availability at reasonable cost
Improve safety	Broadband coverage Reliability	Safer railways (provide push-to-talk everywhere and with data)
Increase capacity	Improved Wifi capacity using Hit Bit Rate service	Allows more passengers to use the service generating more revenue
Improve passenger experience	High bit rate service provides WiFi capacity at affordable cost	• Improved ability to work on trains, better entertainment options • Better information for passengers • Increase attractiveness of rail travel compared to other modes

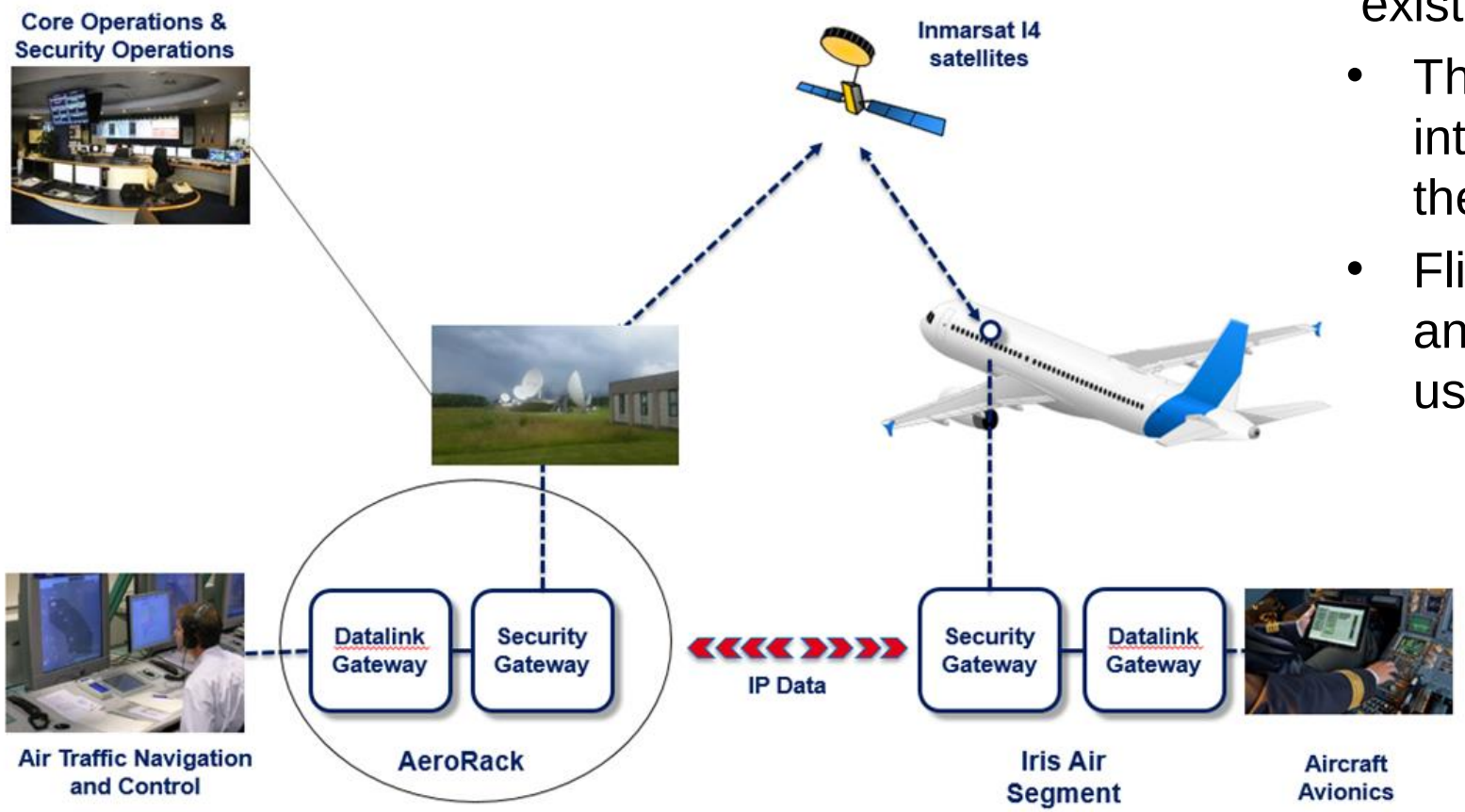
What about passenger connectivity when flying?

- Ground-based systems and satcom based services existed previously
  - But suffer from similar issues to rail, even more pronounced

Inmarsat EAN service provides a hybrid approach, combining ground and satcom systems to provide better availability at lower cost

© Inmarsat

What about flight crew communications?



- As well as availability, there are also security (integrity) concerns with the existing VHF-based services
  - The ESA Iris programme will introduce a hybrid service allowing the pilot to select VHF or satcom
  - Flight trials have been undertaken and commercial services will start using the service next year

Summary and Next Steps…

- Hybrid solutions involving both terrestrial and satellite communications can provide better availability and value for money
  - Successfully implemented for airline passenger communication via Inmarsat EAN
  - Being developed for trains through SODOR project (about to commence)
  - Similar concepts with extra security have been developed for airline flight crew through Iris Programme

- Next Steps
  - Continued evolution of operational EAN and Iris systems for commercial airliners
  - Commercialisation of SODOR and application of the hybrid concept in rail
  - Could a similar approach be useful in other domains such as maritime or road?