NOKIA

Leading the way to 5G

As we enter the era of 5G, rail operators now have a game-changing opportunity to modernize aging railway infrastructures, creating new applications, revenue streams and operating models based on mobile broadband capabilities. **Learn more**

A glimpse into the future

The European Union aims to shift **30%** of road freight to rail or water by 2030 (and 50% by 2050)*

Sea 514 miles/gallon**

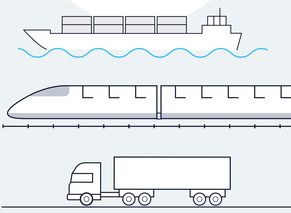
Rail 202 miles/gallon**

Road 59 miles/gallon**

(Number of miles one ton of freight can be carried per gallon of fuel)

Why?

It's more energy efficient, for a start



It's cost efficient too...

According to research rail freight is **70%** cheaper than air**

But it's not just about freight

By 2050 Passenger mobility by rail will increase **200%–300%***

Sources: * International Transport Forum of the OECD ** ABI Research, Rail Freight Digitization and Innovation, April 2018

But, what does everyone want?

Passengers want:	Freight customers want:	Rail operators want:
• A seamless, always connected journey • Alignment between online and in-station experiences • Real time alerts • An immersive travel experience	• More visibility and faster time-to delivery • Collaborative logistics • Real-time cargo tracking	• Improved safety • Lower operating costs • Guaranteed security and compliance • More automation and predictive systems • Happier, loyal customers

Railway infrastructures are ready for an upgrade.

FRMCS | The new standard for the future

What is FRMCS and what can it bring?

Future Railway Mobile Communication System (FRMCS) is the single global standard for railway communications, and the successor to GSM-R.

How do I get on board?

Learn more.

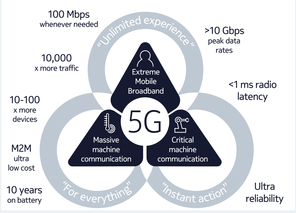
FRMCS improves:

Safety | **Automation** | **Communications** | **Maintenance** | **Customer experience**

Why 5G for FRMCS?

From day one, 5G will fully support the mission-critical needs of rail operators and the FRMCS framework, with ultra-reliable, high-speed, low latency networks that enable faster communications, and support new technologies like AI and machine learning.

5G targets mobile operators & vertical markets



- **Automated train operation**
- **Passenger information systems**
- **Smart station**
- **Smart rail maintenance**
- **Management support systems**
- **Smart infrastructure**

Nokia – leading the way to 5G

Nokia is the leading railway communications solutions provider and, together with Nokia Bell Labs, is developing an innovative 5G portfolio that's tested and proven in the field along with major mobile network operators. With an extensive history in GSMR, we've developed the expertise to modernize and migrate rail networks to the highest safety, efficiency and compliancy standards in the communications industry, as well as best-in-class cyber security solutions.

Nokia Bell Labs Future X architecture for railways is an intelligent, dynamic communications and cloud-based platform to support all railway systems, processes and activities. It enables better interaction between many existing systems, as well as providing a launchpad for innovative applications and services as they migrate to the FMRCS system.

Document code: SR1909038016EN (September) CID206738

Want to learn more?

Discover how 5G can put you on the fast track to FRMCS with this **white paper**

NOKIA