Railways in Korea & KNR's Overseas Projects

May 2022

KOREA NATIONAL RAILWAY

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01 Rail Network in Korea

Ⅰ. Rail Network in Korea – History of Korean Railways

From beginning to decline	2004 Restructuring of railway industry	New beginning and renaissance

1899 to 1950	1960 to 2003	2004 to 2010	2011 to today
Birth of railways in Korea and first steps	Railway industry on decline	Separate infrastructure from operation	Traveling the future in eco-friendly railway
			
1899: Opening of first railway (Gyeongin Line)	1969: Saemaeul train launched for commercial service	2004: Opening of first HSR (Gyeongbu HSR, 300 km/h)	2015: Honam HSR opened 2016: Suseo HSR opened 2017: Wonju-Gangneung HSR opened
			
1950: Korean war	1974: Opening of first MRT (Seoul Metro 1)	2010: KTX-Sancheon launched for commercial service (100% Korean technology)	2021: KTX-Eum launched for commercial service (EMU, 260 km/h)

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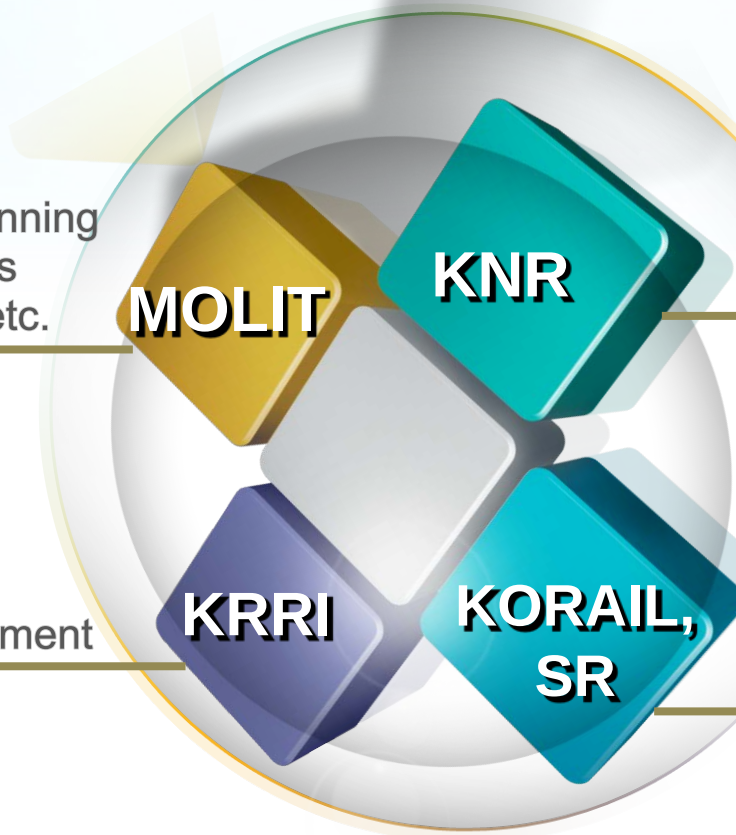
Ⅰ. Rail Network in Korea – Railway organizations



- Railway policy & planning
- Investment programs
- Safety regulations, etc.

- Railway construction
- Rail infrastructure management
- Station and railway land development
- Training & consulting
- Railway projects in other countries

- Railway technology research & development

- Train operation
- Rolling stock management

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02 About KNR

II. About KNR – General information

Head Office in
Daejeon, Republic of Korea

Name	Korea National Railway
Founded	1 January 2004
Organization type	State-owned agency
Annul budget	USD 8,361 million (as of 2022)
Total asset	USD 15,085 million (Independent Auditors' Report 2022)
Credit rating	Domestic AAA Moody's Aa2 S&P AA
Employees	2,194

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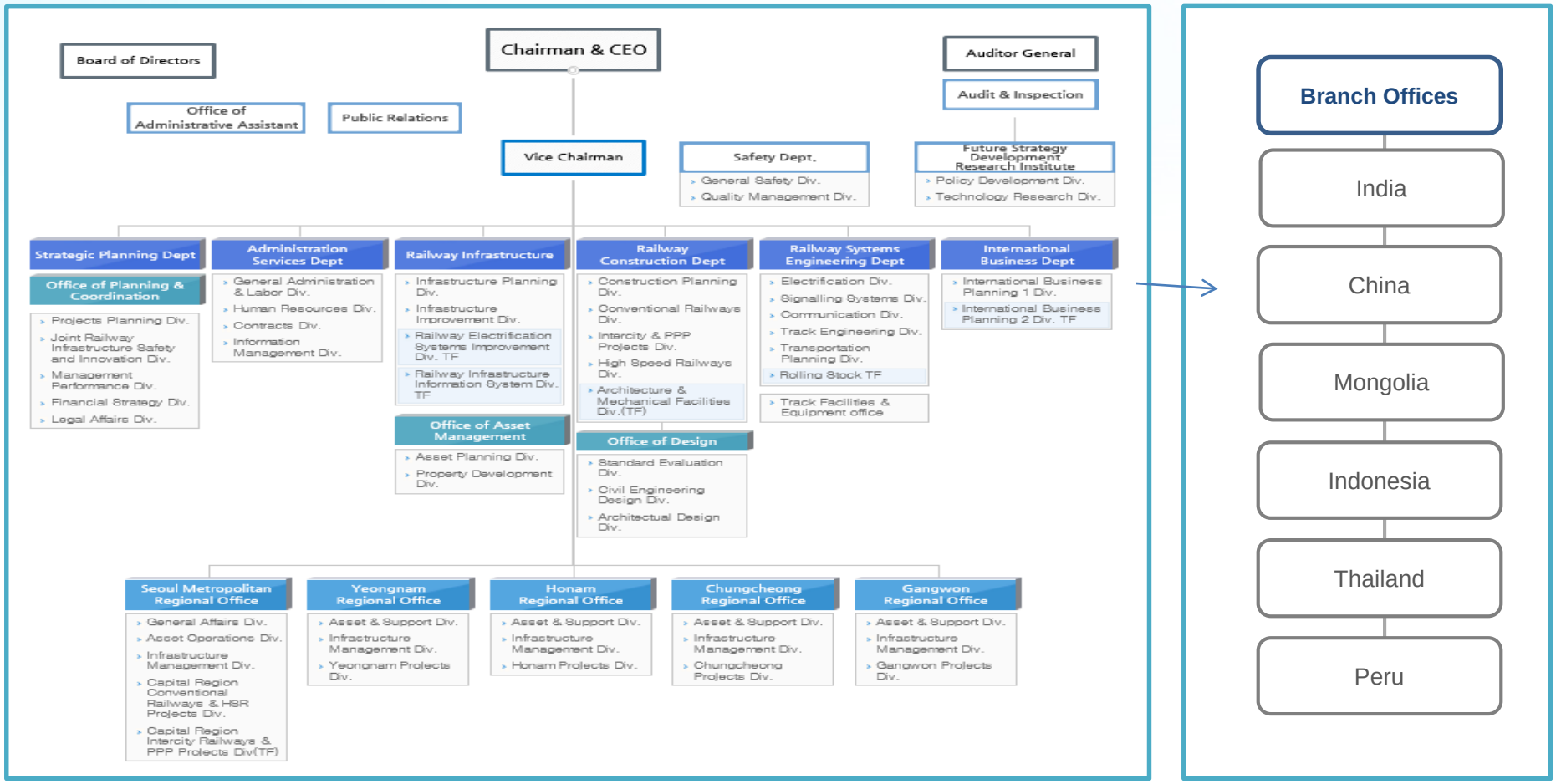
II. About KNR – Organization chart

7 departments (34 divisions), 1 research institute, 5 regional offices, and 6 overseas branch offices



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II. About KNR – Business portfolio

Business areas

1. Rail network planning
2. Project management
3. Railway construction
4. Railway infrastructure management
5. Training & consulting
6. Station area and railway land development
7. Overseas railway projects

PM capabilities

- Planning stage management

- Design control

- Construction mgnt. (Supervision and Inspection)

- Interface management

- Verification, testing & commissioning

→ **Economical, safe and efficient railway**

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Hi FIVE, 5 innovative engineering technologies

Localization of technologies in five key areas including catenary system, signaling, and communications

Five value engineering technologies (Hi-FIVE)

- KR Express Catenary System (KR ECS)
- KR Train Control System (KTCS)
- KR Long Term Evolution-Railway (LTE-R)
- KR Rail Fastening Device (KR RFD)
- KR Line Allocation System (KR LAS)

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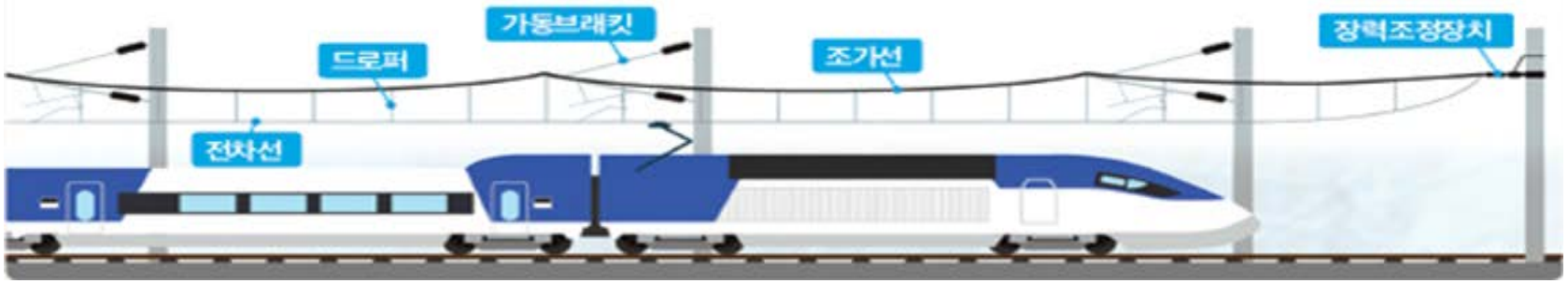
Development and application of KR ECS

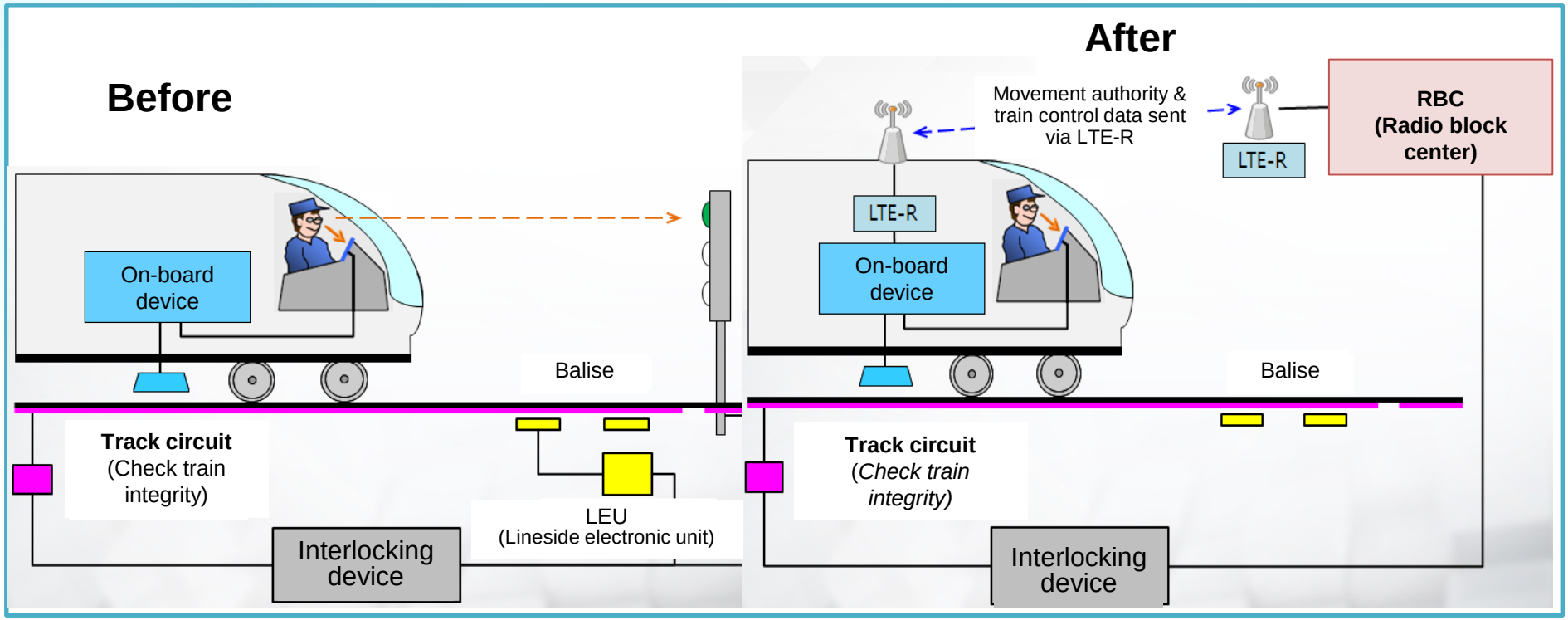
- 100% localization of catenary components
- Commercialized high speed catenary system capable of 350 km/h
- Developed high speed catenary system capable of speeds exceeding 400 km/h
- Developed & commercialized KR ECS design for speedup of conventional lines to 250 km/h
- R-bars developed for 250 km/h and undergoing type testing



KR ECS installed in different civil work environments

At-grade	Elevated	Tunnel
		

II. About KNR – Technology development



	Now	After development	Note
Transmission of train control data	Via landlines	Wireless transmission	World's first train control system using wireless railway communication system (LTE-R)
Interoperability	Different systems for different lines	Standardized	Adopted as international standard (interoperable with Europe's ETCS and China's CTCS)

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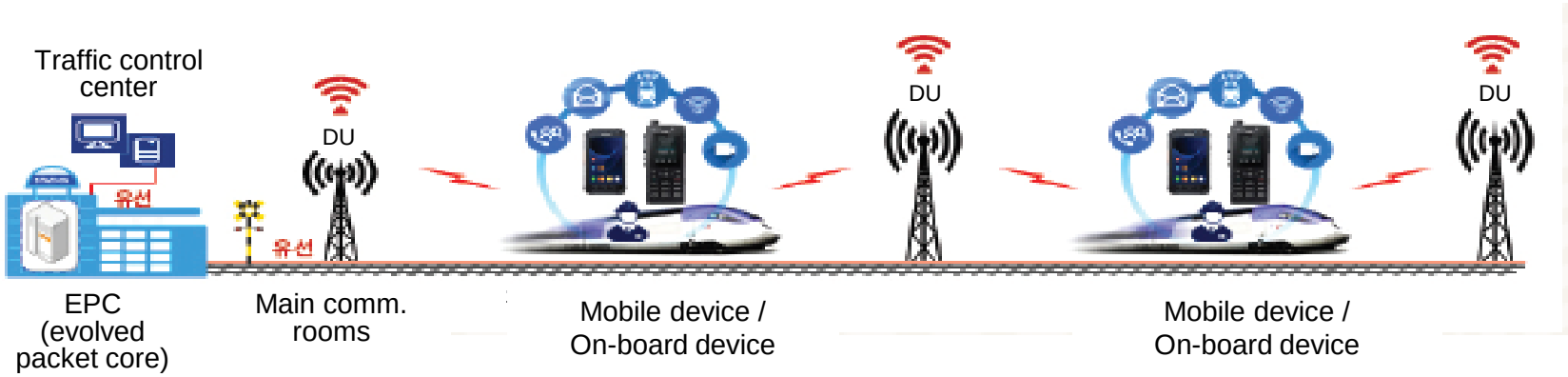
Application of LTE-R using 4G technology for the first time in the world

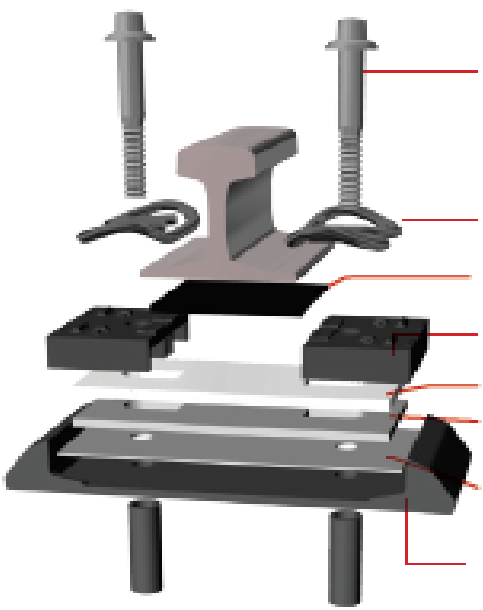


Strong points of LTE-R

LTE-R

- World's first reliable wireless railway communication at 250 km/h
- Highly competitive and globally marketable technology
- Linked to national emergency response system for rapid response
- Send videos and large data which is not possible with TRS
- Rapid accident recovery possible with simultaneous video calls

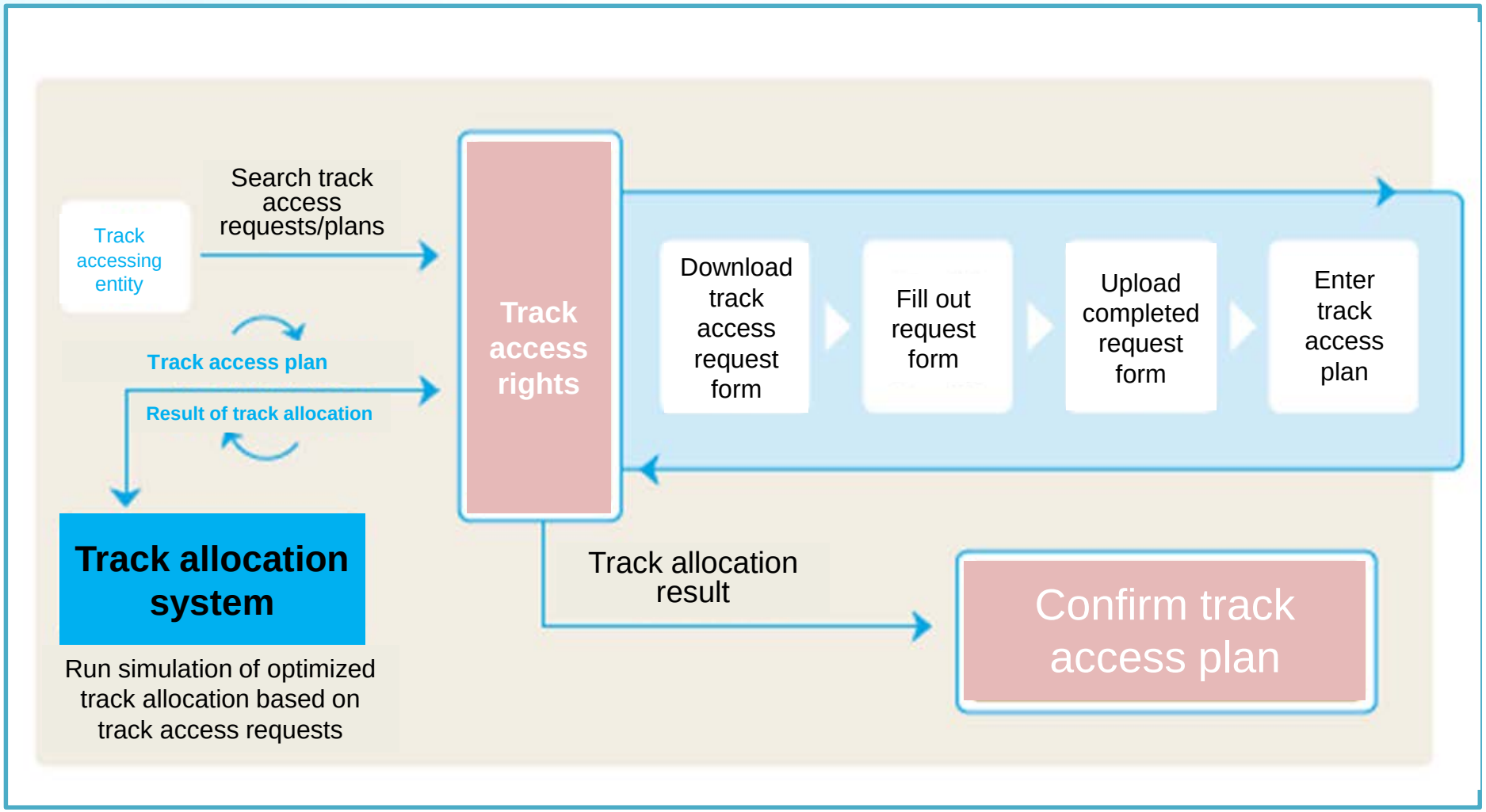
Successful development and commercialization of rail fastening device for high speed slab tracks



Functions

Underplate Guide plate Rail clip Screw spike	Tie plate Elastic pad Base plate Rail pad
Fasten rail and sleeper together, maintain the rail gauge	Decrease vibration and shock of the train on rails, prevent vertical movement of rails

II. About KNR – Technology development



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03 KNR's Performance

III. KNR's Performance – Railways in Korea today

Total length	**4,274 km**
Electrified	2,965 km (74.4%)
HSR (over 300 km/h)	3 lines
Conventional & commuter lines	34 main lines, 55 branch lines

	Linking points	Station-station distance	Financing
HSR (300 km/h)	Major cities	40 km	Central govt. 50%, KNR 50% (65 % of Gyeongbu HSR Phase 1 financed by KNR)
Conventional	Major or midsized cities	20 km	Central govt. 100%
Commuter	Downtown – suburbs	2 to 7 km	Central govt. 70%, local govt. 30%

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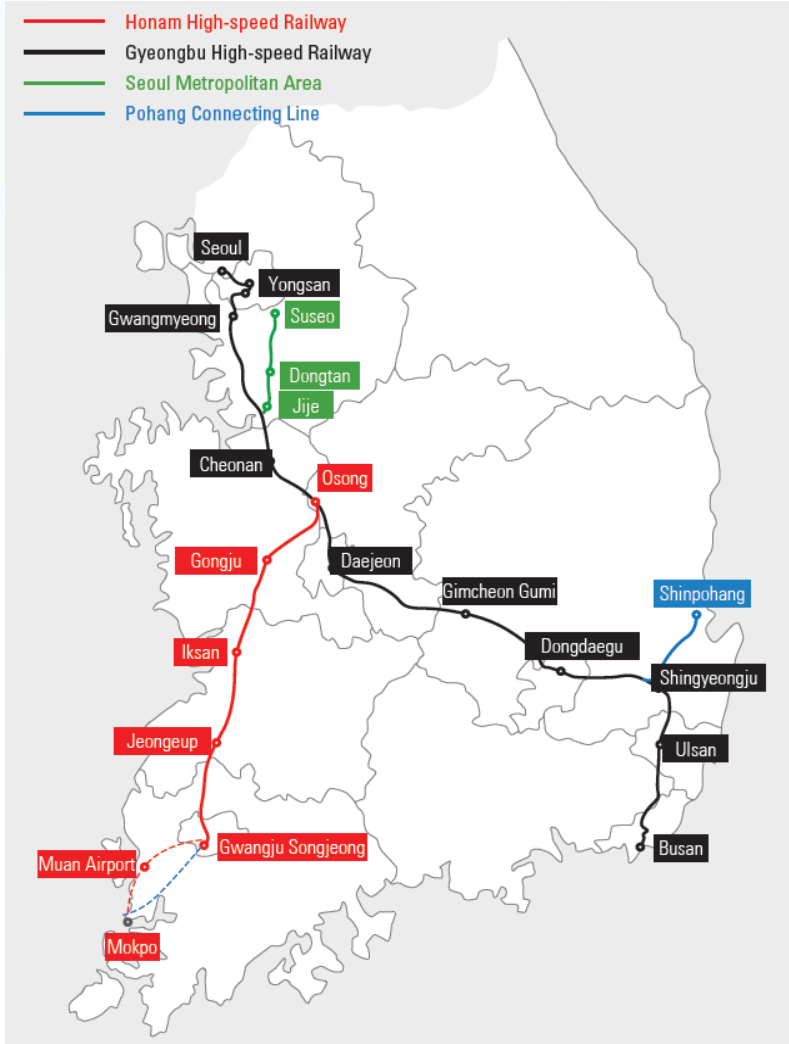
III. KNR's Performance – High speed rail construction



Gyeongbu HSR

- Length: 412.5 km
- Budget: USD 19 billion
- Phase 1 opened in April 2004
- Phase 2 opened in November 2010

Honam HSR

- Length: 183.8 km
- Budget: USD 10 billion
- Opened in April 2015

Suseo HSR

- Length: 61.1 km
- Budget: USD 3.4 billion
- Opened in December 2016

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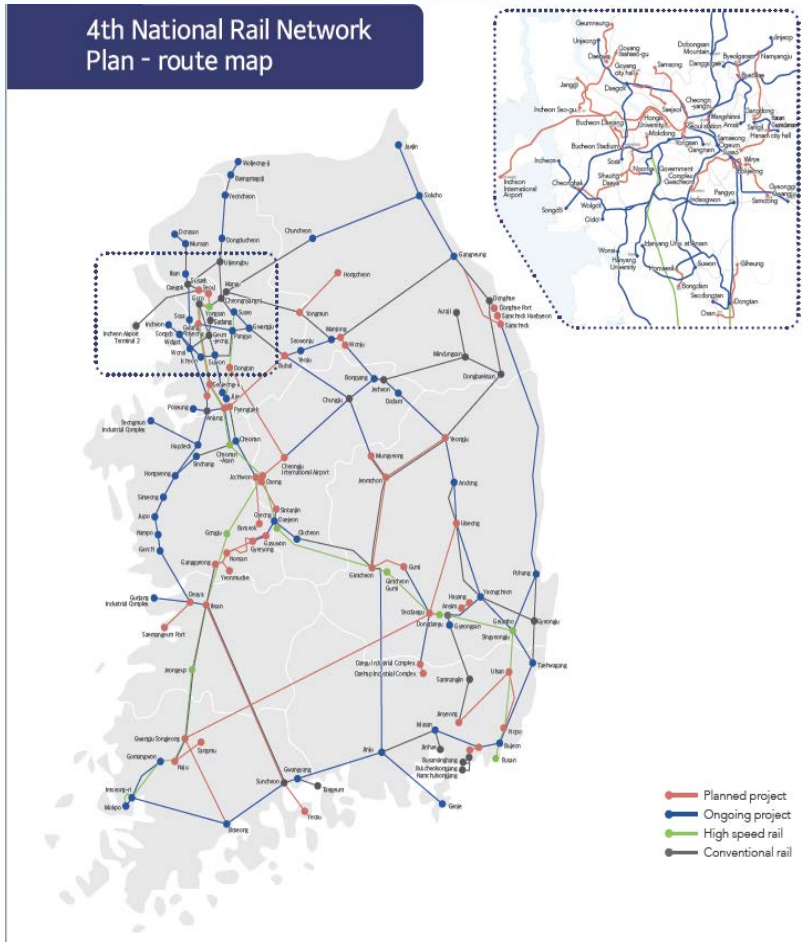
III. KNR's Performance – Conventional and commuter lines



Completed projects

- 343 stations
- 83 lines: 3,413.6 km (electrified 2,308 km)

Ongoing projects including upgrading of existing railways

- Conventional lines:
  22 projects (1,361.5 km)
- Commuter lines:
  7 projects (267.6 km)

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04 Overseas Projects

IV. Overseas Projects

India
- Technical consultancy for detailed design of HSR
- Lucknow Metro Phase 1 General Consultancy

Mongolia
- Tavantolgoi-Zuunbayan Railway Signaling & Communication System Project
- Formulation of Master Plan and Project Management Service for Railway Traffic Control Center

Bangladesh
- Technical consultancy for signaling system modernization
- Construction Supervision of Akhaura – Laksam

China
- 16 construction supervision services for HSR projects

Vietnam
- Engineering consultancy and training service for Vietnam Railway Modernization Projects

USA
- Consultancy Service for California HSR

Philippines
- Consultancy Services for the LRT line 2 east extension

Sudan
- Railway Capacity Building Program

Indonesia
- PMC for Master Plan of JABOTAK railway circular lime improvement
- System package project on Indonesia Jakarta LRT(Light Rail Transit) 1st phase
- Feasibility study on Jakarta LRT 2nd pahse main project
- PMC for Jakarta LRT(Light Rail Transit) 2A phase

Cameroon
- Railway feasibility study for railway construction
- Railway Master Plan

Moroco
- Design Contract for Nouaceur-Marrakech Section of Kenitra-Marrakech HSR

Malaysia
- Consultancy Services for the establishment of MRT system & telecommunication

Nepal
- Feasibility study of mass rapid transit system in Kathmandu Valley
- Detailed survey and design of electrified railway line-Phase1 ~ Phase4
- Railway Capacity Building Program

Thailand
- PMC for high-speed rail linking three airports project

Paraguay
- PMC for FS on the railway construction
- FS for construction of intercity railway
- Building Consultancy to select main contractor for light rail transit

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IV. Overseas Projects

23 countries

79 projects

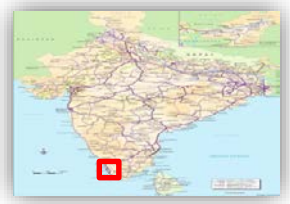
450 Million $

HSR projects in China

- **Supervision:** 5 Projects
- **Consulting:** 7 Projects

California HSR project in USA

- **Consulting: Presino~Bakersfield**
- **Length**: 200 km



HSR project in India

- **Consulting:** Detail Design of HSR
- **Length:** 527 km

Jakarta LRT 1st Phase Project

- **EPC Procurement:** Systems & RS
- **Length:** 5.8 km

Malaysia MRT Project

- **PMC** for communication system
- **Length**: 51 km

Nepal Railway Project

- **FS:** Mbalam~Kribi
- **Length**: 583.4 km

Paraguay Railway Project

- **FS:** Asuncion~Ypacarai
- **Length**: 44 km

India Lucknow MRT Project

- General Consulting
- **Length**: 8.5 km

2005 China
Construction supervision

2011 Nepal
Nepal feasibility study service

2012 Malaysia
MRT PM consulting

2013 USA
HSR technical consulting service

2014 Paraguay
MRT feasibility study

2015 India
Lucknow Metro GC

2016 Indonesia
Jakarta LRT Phase 1 EPC

2017 Indonesia
Jakarta~Surabaya FS

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IV. Overseas Projects - Ongoing

Country	Project	Duration (months)	Contract value
Bangladesh	Construction Supervision Service for Akhaura-Laksam Double Tracking	74 mos.	USD 30M
Egypt	Consulting Service for Modernization of Railway Signaling System on Nagh Hammady-Luxor Corridor	52 mos.	USD 3M
Philippines	Consulting Services for LRT Line 2 West Extension Project	58 mos.	USD 6M
Indonesia	PMC for Jakarta LRT Project – Corridor 1 Phase 2A	44 mos.	USD 15M
Indonesia	Capacity Building Program for Jakarta LRT Operation	23 mos.	USD 1.8M
Thailand	PM and CS of 3 Airports Linked HSR	59 mos.	USD 131M
Costa Rica	Feasibility Study Service for Restoration of Railway between Puntarenas and San Jose (98.3 km)	10 mos.	USD 0.6M
El Salvador	Feasibility study on route between Sal Salvador and La Hachadura	12 mos.	USD 0.5M
Philippines	Preliminary Feasibility Study for Cogen Extension of Manila LRT Line 2	8 mos.	USD 0.3M
Mongolia	Tavantolgoi-Zuunbayan Railway Signaling & Communication System	11 mos.	USD 42M
Mongolia	Formulation of Master Plan and Project Management Service for Railway Traffic Control Center	60 mos.	USD 3M
Morocco	Design Contract for Nouceur-Marrakech Section of Kenitra-Marrakech HSR	24 mos.	USD 12M

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KNR & WB cooperation in speed enhancement

- WB’s interest in speed enhancement of existing railways
- Speed enhancement project applicable country and railway corridor
- Financial supports from WB for feasibility studies on existing railway speed enhancement
- WB’s views on potential areas of cooperation with KNR

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Thank you!

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