

## LIST OF ABBREVIATION

3GPP	:	Third Generation Partnership Project
5G	:	Fifth Generation
5G-R	:	Fifth Generation-Railways
ATC	:	Automatic Train Control
ATO	:	Automatic Train Operation
BHP-IPFR	:	Spectrum Fee of Bandwidth License
BHP-ISR	:	Spectrum Fee of Apparatus License
BPS	:	Central Statistic Agency of Indonesia
BS	:	Base Stations
CAPEX	:	Capital Expenditure
CTCS	:	China Train Control System
CSP	:	Communication Service Providers
ECC	:	Electronic Communication Committee
EIRENE	:	Europe Integrated Railway Radio Network Enhancement
EMBB	:	Enhanced Mobile Broadband
ERMTS	:	European Rail Traffic Management System
ETCS	:	European Train Control System
ETSI	:	European Telecommunications Standard Institute
FDD	:	Frequency Division Duplex
FFR	:	Fractional Frequency Reuse
FRMCS	:	Future Railway Mobile Communication System
FSPL	:	Free Space Path Loss
GSM	:	Global System for Mobile Communications
GSM-R	:	Global System for Mobile Communications-Railway
HSR	:	High Speed Railways
IRR	:	Internal Rate of Return
ISM	:	Industrial, Scientific, and Medical
ITU	:	International Telecommunication Union
LOS	:	Line of Sight
M2M	:	Machine-to-Machine
MAPL	:	Maximum Allowable Path Loss
MMTC	:	Massive Machine-Type Communications

MORANE	:	Mobile radio for Railway Networks in Europe
NLOS	:	Non Line of Sight
NPV	:	Net Present Value
NR	:	New Radio
O2O	:	Outdoor-to-Outdoor
OPEX	:	Operational Expenditure
PP	:	Payback Period
ROA	:	Return on Assets
ROE	:	Return on Equity
RMa	:	Rural Macro
SNR	:	Signal to Noise Power Ratio
SUE	:	Spectrum Utilization Efficiency
TASFRI	:	Table of Radio Frequency Spectrum Allocation in Indonesia
TDD	:	Time Division Duplex
TETRA	:	Terrestrial Trunk Radio - Railway
TOBA	:	Telecom On-Board Architecture
TR	:	Technical Report
UIC	:	Union Internationale des Chemins de Fer
UMa	:	Urban Macro
URLLC	:	Ultra Reliable Low Latency Communications
UT	:	User Terminal