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TERMINOLOGY FOR THE INNOVATIVE RAILWAY TELECOMMUNICATION SYSTEM BASED ON 4G/5G TECHNOLOGY

Terminology for the innovative railway telecommunication system based on 4G/5G technology

1. General terms

#	Term/abbreviation	Definition
1.	**Public telecommunications network**	A multitude of interconnected telecommunications networks, including networks for TV and/or radio broadcasting. A public telecommunications network is designed to provide paid telecommunications services to any communications service user within a state. It includes those telecommunications networks that are geographically defined within the service area and numbering resource, and those that are not geographically defined within the state and numbering resource, as well as those networks that are defined by a technology for providing communications services. A public communications network is connected to public communications networks of foreign states.
2.	**Technological communications network**	Communication networks designed to support business operations of organisations and manage work processes in industry.
3.	**Telecommunications**	Any radiated emissions, transmission or reception of symbols, signals, voice messages, written text, images, sounds or messages of any kind over electromagnetic systems.
4.	**Railway telecommunications**	Any radiated emissions, transmission or reception of symbols, signals, voice messages, written text, images, sounds or messages of any kind over electromagnetic systems intended for the organisation and execution of railway operational processes.
5.	**Railway radio communications**	Railway telecommunications using radio waves.
6.	**Railway telecommunications subsystem**	Railway transport infrastructure subsystem which consists of railway telecommunications equipment and facilities.
7.	**Railway telecommunications network**	A technical system comprising communication lines and equipment for railway telecommunications.
8.	**Railway telecommunications system**	A set of railway telecommunications equipment and subsystems intended to provide a specific type of telecommunications service.
9.	**Means of railway telecommunications**	Hardware and software used to support the operation of railway telecommunications networks.
10.	**Railway telecommunications facilities**	Utility structures used to accommodate railway telecommunications equipment and cables.
11.	**Railway telecommunications network (system) data resources**	The sum of data stored and used to ensure the operation of a railway telecommunications network [system], processed and transmitted data including user data and/or railway telecommunications network [system] management data.
12.	**Railway telecommunications subscriber**	A railway worker who uses railway telecommunications and has an assigned subscriber number or a unique identification code.
13.	**Railway telecommunications network (system) user**	A railway worker or any other individual or legal entity using means and/or services of a railway telecommunications network [system].
14.	**Railway telecommunications**	An output of the owner of railway telecommunications infrastructure, its structural subdivision or other communications

#	Term/abbreviation	Definition
	service	service provider in the form of providing access to railway telecommunications.
15.	**Railway telecommunications service provider**	The owner of railway telecommunications infrastructure, its structural subdivision, or any other railway telecommunications service provider.
16.	**Railway telecommunications infrastructure owner**	A legal entity or sole trader that holds railway telecommunications equipment and/or facilities under property rights or other rights.
17.	**Individual call**	An individual call means that a switched point-to-point connection is established between two subscribers to enable direct two-way duplex communication.
18.	**Group call**	A group call is used to communicate voice information from a calling party to several subscribers in duplex or half-duplex mode.
19.	**Broadcast call**	A broadcast call is used to communicate voice information from one party to several other parties.
20.	**Point-to-multipoint call**	A selective call to all or a group of subscribers whose stations are automatically switched into a point-to-multipoint call and put on a speaker.
21.	**Emergency railway call**	A top priority warning call to alert drivers, supervisors and other personnel of a dangerous situation in a certain area.
22.	**Voice call**	Voice-based information exchange requiring appropriate quality of service, regardless of the communication channel.
23.	**Base station coverage area**	An area where the radio signal level generated by the base station at the antenna feeder assembly exceeds the sensitivity level of a subscriber radio station's receiver.
24.	**Base station service area**	An area where subscriber radio stations receive base station service with a required quality.
25.	**Traffic supervisor's operational and technological communication console; OTC**	An intercom console used by a railway traffic supervisor for operational and technological calls and communication with subscribers involved in the supervisor's tasks.
26.	**Radio-electronic equipment**	Equipment designed to transmit and/or receive radio waves, consisting of one or more transmitting and/or receiving units or a combination of such units, and supplementary hardware.
27.	**Stationary radio station of a railway communications network (system); RS**	A railway communications network (system) radio station, fixed in a service room of a technical facility at a railway station or in a container.
28.	**Mobile locomotive radio station**	A radio station installed in a railway vehicle such as a locomotive, carriage, track maintenance car or trolley for communication between drivers of vehicles and the personnel involved in train control and execution of technical operations.
29.	**Mobile vehicle-mounted radio station**	A radio station installed in a vehicle and designed for communication within a railway communication network or system when a vehicle is in motion or stationary.
30.	**Portable radio station for railway comms; RN**	A radio station with an independent power source designed to operate in a railway radio communication network or system while being carried or at a stop.
31.	**Data radio station for railway communications**	A radio station for transmission and reception of data associated with the process control and railway safety systems.

#	Term/abbreviation	Definition
32.	**Control station of a railway communications system; SR**	A unit installed in an operational traffic supervision centre, connected to the wireline channel for radio communication with trains or repair crews and intended for communication between traffic supervisors and locomotive drivers, station masters-on-duty, and repair personnel managers.
33.	**Base station of a railway communications system; BS**	A stationary radio communication installation comprising a transceiver, a control unit, a communication unit and a power supply unit, which distributes calls and authenticates users in railway cellular and trunking wireless communication networks.
34.	**Retransmission unit of a railway communications network (system)**	A piece of telecommunication equipment designed to relay radio signals in order to increase the range of radio communication between fixed, mobile and portable radio stations in a railway radio communication network [system].
35.	**Traffic supervision system of a digital railway communications network**	An installation comprising a control system server, computer-based control panels, station master-on-duty consoles and switching equipment, designed to establish calls and handle communications in a digital railway radio network between fixed and mobile subscribers in various configurations.
36.	**Antenna feeder assembly of a railway communications transceiver; AFU**	A cluster of antennas, feeders, and auxiliary devices used to transmit radio frequency signals from a radio transmitter to an antenna, or to receive signals from an antenna and send them to a radio receiver.
37.	**Electromagnetic compatibility of railway communications equipment; EMC**	The ability of railway telecommunications equipment to operate at a given performance level in a given electromagnetic environment without causing unacceptable electromagnetic interference to other technical equipment.
38.	**Industrial radio interference from railway infrastructure and rolling stock**	Industrial electromagnetic emissions associated with current leakage, operation of electrical equipment on mobile objects, transient processes in catenaries, high-voltage lines, traction substations, which have a disruptive, harmful effect on the reception of service signals in the frequency bands allocated for railway radio communications as well as the reception of radio and television broadcasts.
39.	**Interference suppression devices for traction units**	Technical equipment installed on traction units to reduce the level of industrial radio interference.
40.	**Information security of a railway communications network (system)**	The state of protection of railway telecommunications network [system] information resources from a certain set of information security threats, which ensures the confidentiality, availability and integrity of information that is transferred, processed and stored in the network [system].
41.	**Information security system of a railway communications network (system)**	A set of legal rules, administrative and technical measures concerning information security and protection mechanisms, as well as railway telecommunications network [system] management bodies and operators whose purpose is to combat a specific set of threats to the information security of the [system] in order to minimise potential damage to subscribers or owners of railway transport telecommunications infrastructure.

2. **Railway telecommunications networks and systems**

#	Term/abbreviation	Definition
42.	**Railway backhaul network**	A set of networks based on a variety of telecommunications technologies that deliver information in the form of railway telecommunications signals from any port to any given port or group of ports.
43.	**Railway optical backhaul network**	A railway telecommunications backhaul network where all functions are implemented through optical technology without conversion to electronic form.
44.	**Railway communications access network**	A range of subscriber lines, regardless of the technology used to set them up as well as the transmission and switching equipment, that enable the transmission of users' data traffic, the exchange of service messages and maintain quality of service indices when providing railway telecommunications services between a transport network port and each user's network interface.
45.	**Railway operational and technological communications network; OTC**	A railway telecommunications network, which is a combination of a computer appliance, switches, switching stations and/or railway telecommunications digital networking equipment, lines, network paths and subscriber terminals, which are intended for the prompt management of railway transport operations associated with train traffic control, carriage, and routine maintenance of railway infrastructure.
46.	**Station facilities two-way communications network; SDPS**	Part of the station network for operational and technological communications, designed for giving alerts and conducting negotiations between railway station operations managers and personnel located both in the offices and in the station grounds.
47.	**Railway technological telephone network; ObTS**	A railway telecommunications network consisting of PBXs, automatic switches, directory assistance services, point -to-multipoint calling system, billing, telephone network lines and channels, and subscriber terminals which meets the needs of railway structural units for fixed telephony throughout the entire railway network for the purpose of overall operational management.
48.	**Railway technological audio-conferencing system; STAks**	A railway telecommunications system consisting of switches, studio equipment, lines, channels, and subscriber terminals designed for conducting conference calls, associated with railway transport operations.
49.	**Railway technological video conferencing system; STVks**	A railway telecommunications system consisting of multipoint video conferencing servers, call management stations, a numbering and addressing plan, subscriber terminal sets, television channels, designed to transmit video and audio information between video conference participants located in studios or offices or holding mobile terminals.
50.	**Railway telegraph network**	A railway telecommunications network consisting of a set of switches and nodes, communication channels, interstation and subscriber-level lines and teletype machine designed to transmit operational information, executive instructions and other communications in the form of official telegram messages.
51.	**Railway business call logging system; S DRP**	An electronic system designed for automated logging of business calls made over railway telecommunications networks by supervisors, station masters-on-duty, and other personnel directly involved in train traffic and shunting operations.
52.	**Railway/regional – operational and technological data**	A specialised railway [regional] level data network designed to support real-time supervision and control functions.

#	Term/abbreviation	Definition
	transmission network; SPD OTN	
53.	**Railway wireless communications network**	A railway telecommunications network, comprising a range of railway radio communications equipment and radio wave transmission media, designed to provide communications between fixed and mobile subscribers involved in execution of operational processes and/or to deliver messages from information and control systems.
54.	**Railway wireless communications system**	Railway telecommunications system built up from one or more railway wireless networks, hard-line communication lines, subsystems for control, numbering, billing, and call recording.
55.	**Wireless communications system for trains; PRS**	A railway radio communications system for real-time train traffic control, enabling information interchange between personnel involved in the operation of trains.
56.	**Wireless communications system for stations; SRS**	A railway radio communications system for the real-time management of railway station operations, enabling information interchange between personnel involved in train handling.
57.	**Railway Wireless communications system for repair crews; RORS**	A railway radio communications system for the real-time management of repair and refurbishment work on railways, enabling information interchange between personnel within a work site and with the supervisors of repair units.
58.	**Railway wireless network for hump operations**	A railway radio communications network for managing train breaking up operations at marshalling yard humps, enabling information interchange between personnel involved in breaking up trains.
59.	**Railway wireless network for shunting operations**	A railway radio communications network for real-time management of operations at stations, enabling information interchange between shunting dispatchers, shunting locomotive drivers, train dispatchers, operators in charge of acceptance, formation and departures.
60.	**Railway wireless data transmission system**	Railway radio communications system for data interchange between a variety of railway transport information and control systems.
61.	**Data transmission system for shunting engines control**	A railway radio communications system designed to deliver control and command messages between automatic signalling units and shunting locomotives within a railway station.
62.	**Railway digital comms network clock synchronisation system; TSS**	A set of equipment that provides synchronisation signals to all elements of railway digital telecommunications network in order to maintain standardised time intervals between digital signals. Exceeding these intervals leads to a deterioration of quality and loss of connection. A system may deliver the following types of synchronisation: frequency, phase and time.
63.	**Railway digital communications network clock synchronisation**	A network structure built around a railway telecommunications network that enables the transmission of synchronisation signals over this network.
64.	**Railway digital communications network numbering system**	A set of rules and regulations governing the allocation and assignment of digital identifiers to railway telecommunications networks, types of communications within a network, stations, hubs and subscriber terminals. These rules and regulations determine how subscriber numbers and network indices are used when establishing a connection.
65.	**Railway digital communications network signalling**	A set of telecommunications signals and their exchange algorithms that control connections in a railway telecommunications network, inform subscribers about their connection status, and deliver

#	Term/abbreviation	Definition
	system	information to technical operators.
66.	**Communications services automatic billing system**	A computerised system for accounting of provided communication services, billing, subscriber invoicing, settlements with other service providers and payment control.
67.	**Connectivity with the emergency railway repair sites**	A set of procedures and measures implemented by control and operational units of a telecommunications infrastructure owner to arrange communication between personnel performing emergency repair work at an incident site, whether natural or caused by human activity, and the management of a federal railway transport agency, a railway department or branch and, if necessary, federal executive bodies in charge of overall accident management.

3. Lines, systems, transmission channels

#	Term/abbreviation	Definition
68.	**Railway transmission line**	A set of paths of railway transport transmission systems and/or standard physical circuits that have shared path facilities, maintenance equipment, and the same propagation medium within the service area of the maintenance equipment.
69.	**Group call channel for supervisors**	A railway operational and technological communication channel for distributed conference calls, enabling communication between a traffic supervisor and his subordinates. Each subscriber can talk to any other subscriber and to the traffic supervisor, who has the right to interrupt any subscriber in his control loop.
70.	**Railway operational and technological communications supervisors loop**	A group of OTC channels and subscriber terminals used for service communication between a traffic supervisor and his subordinated railway personnel within the boundaries of the traffic control loop.
71.	**Line path**	A suite of transmission system hardware that ensures the transmission of railway telecommunications signals at a rate or in a frequency band that matches the transmission system.

4. Digital wireless communication systems

№	Term/abbreviation	Definition
72.	**DMR — Digital Mobile Radio**	An open standard for digital radio communications developed and defined by ETSI (European Telecommunications Standards Institute).
73.	**GSM-R – Global System for Mobile communications — Railway**	The European Train Control System radio communication standard. GSM-R is a highly reliable wireless communication platform for railways based on GSM technology.
74.	**TETRA**	An open standard for digital trunked radio communications

№	Term/abbreviation	Definition
		developed in 1995 by the European Telecommunications Standards Institute (ETSI) to replace the obsolete MPT 1327 standard.
75.	**LTE – Long-Term Evolution**	Fourth generation (4G) wireless communication standard.
76.	**Subsystem of applications required to roll out base and new operational and technological communications services**	A set of computer appliance, hardware and software required to build an operational and technological communication system based on the LTE compliant mobile broadband wireless access system.
77.	**MIMO – Multiple Input Multiple Output**	A technology of using multiple transmitting and multiple receiving antennas.
78.	**MVNO – mobile virtual network operator**	A virtual mobile network operator that uses another operator's infrastructure but sells services under its own name and brand.
79.	**QCI – QoS Class Identifier**	Quality of service class identifier.
80.	**QoS - Quality of Service**	Quality of service - a technology for assigning different service priorities to different classes of traffic.
81.	**TDD – Time Division Duplex**	A method of dividing the receive and transmit channels by time.
82.	**FDD – Frequency Division Duplex**	A method of dividing receive and transmit channels by frequency.
83.	**API – Application Programming Interface**	A set of ready-to-use classes, procedures, functions, structures, and constants provided by an application (library, service) or an operating system for use in external software products.
84.	**Mission Critical communications services**	Communication services in mission-critical communication networks designed for the real-time management of workflows at mission-critical infrastructure facilities. Mission-critical communication services are: mission-critical voice communication (MCPTT); mission-critical video communication (MCVideo); mission-critical data transmission (MCData).
85.	**MCX – Mission Critical Service**	A communications service that enables mission critical applications.
86.	**MCData – Mission critical Data**	Mission critical data – mission critical applications in data networks.
87.	**MCVideo – Mission critical Video**	Mission critical video – mission critical applications in communication networks for video traffic.
88.	**Data transmission**	Exchange of information in the form of data.
89.	**SIM-card**	An electronic subscriber identity module used in GSM and LTE mobile communication networks.
90.	**Embedded SIM (eSIM)**	The technology of an embedded, non-removable or virtualised SIM card in a subscriber device.
91.	**3GPP**	3-rd Generation Partnership Project
92.	**LTE terminal**	A structurally and functionally complete device designed to provide communication and other services in LTE standard communication networks. Subscriber terminals are classified by their purpose, design, category, functionality and other parameters.

№	Term/abbreviation	Definition
93.	**Railway communications equipment mean time to failure**	The ratio between the total operating time of a repairable railway telecommunications device and the mathematical expectation of the number of its failures during such operating time.

5. Quality of user service, quality of service provision, quality of network operation

№	Term/abbreviation	Definition
94.	**Railway communications network (system) quality of user service**	A sum of economic, social and other indicators or parameters assessed from a user perspective and characterising the degree of user satisfaction with the quality of communication services.
95.	**Railway communications network (system) quality of service provision**	A sum of parameters which take into account the quality of operation of all elements of a railway telecommunications network and the quality of service provided to users.
96.	**Railway communications network (system) quality of network operation**	A sum of parameters characterising the quality of service at various segments of a railway telecommunications network and across the network as a whole, subscriber to subscriber as per technical requirements for equipment, communication channels, and their performance level.
97.	**Quality of service parameters (service provision, user service)**	Values obtained from measurements, surveys, monitoring, administrative or statistical reports, which are used to assess quality performance.
98.	**Quality of service indicators (service provision, user service)**	Values obtained as a result of analyses of quality parameters. These values are used to assess the performance of the holder of railway telecommunications infrastructure or its division responsible for providing network services and customer support.
99.	**Indicators of means of railway communications performance**	Indicators characterising the performance of railway telecommunications equipment at specified failure probabilities.
100.	**Indicators of call service quality in a railway communications network (system)**	Indicators characterising the dropped-call rate at parts of a railway telecommunications network [system] and across the network [system] as a whole when handling incoming traffic.
101.	**Railway communications network quality indicators monitoring**	Monitoring the compliance of service quality indicators and service provision with relevant requirements.
102.	**Railway communications network quality indicators monitoring system**	A bundle of control tools, operators, and identified control objects working together according to the rules set out in a relevant regulatory document.
103.	**Railway communications service level agreement**	A written contract between a supplier and a consumer of railway telecommunications services, documenting rendered services and their agreed service level, including service quality indicators and their acceptable values, methods and means of their control, mutual responsibilities of a supplier and a user, cost of services, settlement procedure and dispute resolution.

6. Digital transformation

№	Term/abbreviation	Definition
104.	**Digital transformation**	The process of incorporating digital technologies and innovations into business processes in order to improve efficiency, optimise costs, increase productivity and enhance the competitiveness of an organisation.
105.	**Digital railway station**	A concept that defines the directions for development and improvement of stations through digital transformation, involving a combination of measures designed to align functional chains into a single end-to-end workflow.
106.	**Automation**	The use of technology, economic and mathematical methods, and management systems that partially or completely eliminate the need for human involvement in the processes of obtaining, transforming, sending, and using energy, materials, or information.
107.	**Digitalisation**	The process of transitioning from analogue data and workflows to a digital format.
108.	**Artificial intelligence; AI**	The ability of artificial intelligent systems to perform creative functions that are traditionally considered to be the preserve of humans.
109.	**Machine learning**	A set of artificial intelligence methods that can be used to create self-learning computer systems (in particular, neural networks).
110.	**Neural network**	A system, software or algorithm that operates like a human brain and is capable of self-learning.
111.	**Internet of Things; IoT**	A concept of a data network between physical objects (‘things’) with embedded tools and tech to interact with each other or the outside world.
112.	**Application Programming Interface; API**	A set of methods and rules by which different applications communicate with each other and exchange data.
113.	**Key Performance Indicator; KPI**	Numerical indicators of system/equipment performance that help assess the effectiveness and efficiency of the system/equipment.
114.	**Digital infrastructure**	A group of digital technologies and products based on them that enable computing, telecommunications, and networking capabilities.
115.	**Big Data**	Large volumes of structured and unstructured data of considerable diversity, as well as technology for processing and analysing huge data sets.
116.	**Virtual reality; VR**	A world created by means of technology and presented to humans through their senses: sight, hearing, touch, and others.
117.	**Augmented reality; AR**	The result of introducing any sensory data into a person's field of vision in order to enhance one's awareness of the surroundings and alter one's perception of the environment.
118.	**Cybersecurity**	A set of methods and practices used to protect computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks.