

Signal and Telecom

Signalling:

a) Advanced Signalling System:

To increase Efficiency as well as Safety in train operations, Advanced Signalling System with Route Relay / Panel / Electronic Interlocking (PI/RRI/EI) along with Multi Aspect Colour Light Signals have been progressively provided at 5,211 stations covering 85% of Broad Gauge stations of Indian Railways, replacing Outdated Multi Cabin Mechanical Signalling system involving a large number of human interfaces.

b) Complete Track Circuiting:

Complete Track Circuiting has been done upto 99.8% on A, B and C routes. Fouling Mark to Fouling Mark track circuiting on 'A', 'B' 'C', 'D Special' and 'E Special' routes, where permissible speed is more than 75 kilometres per hour has been completed.

c) Block Proving Axle Counter :

To enhance safety, automatic verification of complete arrival of train, Block Proving Axle Counter (BPAC) is being provided at stations having centralized operation of points and signals.

d) Automatic Block Signalling :

Signalling provides a low cost option by provision of Automatic Block Signalling for augmenting Line Capacity and reduce headway on existing High Density Routes on Indian Railways. As on 31.03.2014, Automatic Signalling has been provided on 2,623 Route Kms.

e) Train Protection and Warning System (TPWS) :

Train Protection and Warning System (TPWS) prevents train accidents caused by human error like Signal Passing at Danger (SPAD) and Over Speeding. Pilot project of TPWS (ETCS Level-1) (European Train Control System) has been commissioned on 50 RKms. suburban section of Southern Railway. Commercial trials of pilot project on 200 RKms. of Northern/North Central Railway is in progress with 35 locomotives on nominated trains. During 2013-14, TPWS system has been introduced in commercial service on all the rakes on Dum Dum Kavi Shubhash section of Kolkata Metro (25 RKms.). Work for provision of TPWS on Basin Bridge-Arakonam Section (67 RKms) of Southern Railway has been awarded in April, 2014 by Southern Railway and is in progress.

f) Train Management System (TMS):

TMS helps in real-time monitoring of trains in the control room. The arrival status of local trains is displayed on indicators installed on platforms in the form of a countdown (in minutes) to the train's arrival on the platform is displayed on indicators, accompanied by automatic announcements on platforms. Indian Railways Institute of Signal Engineering and Telecommunications (IRISET) was set up in 1957 to cater to specialized training needs of staff and officers in the field of Railways Signalling & Telecommunication (S&T). E-Learning network has been provided to connect IRISET with all S&T Training Centres of Zonal Railways for computer based interactive learning of trainees.

g) Interlocking with Signals at Level Crossing Gates :

Accidents at Level Crossings have been a major area of concern. Indian Railways have provided interlocking with Signals at more than 10,000 Level Crossing Gates to enhance the safety at Level Crossings. Initiative has been taken to Interlock Level Crossing gate with Train Vehicle Units of 20,000 and above.

The progress of deployment of various signalling devices as on March 31, 2014 vis-à-vis last year is as follows:-

Installation	(in units)	
	As on 31.3.2013	As on 31.3.2014
Panel Interlocking (No. of stations)	4,160	4,200
Electronic Interlocking (No. of stations)	614	735
Route Relay Interlocking (No. of stations)	265	276
LED Lit Signals (No. of stations)	5,131	5,449
Data Loggers (No. of stations)	5,020	5,292
Colour Light Signalling (No. of stations)	5,517	5,658
Last Vehicle Check by Axle Counters (No. of Block Sections)	3,895	4,175
Track Circuiting (No. of locations)	29,940	30,509
Automatic Block Signalling (Route kilometres)	2,435	2,623
Intermediate Block Signalling (No. of Block Sections)	426	449
Interlocked Level Crossings Gates (Nos.)	10,364	10,493

Telecommunication:

Telecommunication plays an important role in train control, operation and safety on IR. Indian Railways has set up a state of the art, nationwide telecom network for meeting its communication needs. RailTel, a Railways Central Public Sector Enterprise formed in September, 2000 is successfully exploiting surplus capacity of IR Telecom network commercially.

As on March 2013, Indian Railways has about 46,850 Route Kilometres of Optical Fibre Cable (OFC) that is carrying Gigabits of traffic. Railways Control Communication which is quintessential for train operation and control is also being transferred to OFC system. Till date control communication on 42,533 RKms. has been shifted on OFC system. This OFC network is also contributing significantly in building National Knowledge Network through RailTel. It is also planning to provide Broadband connectivity to Panchayats is also being contemplated through this OFC network.

Indian Railways have decided to adopt Global System of Mobile Communication - Railways (GSM-R) based Mobile Train Radio

Communication. The same has already been provided on 2,264 Route Kms. and is being extended in balance 'A', 'B' & 'C' routes.

Indian Railways has its own satellite hub that is being utilized for connecting remote location for Freight Operation Information System (FOIS), Unreserved Ticketing System (UTS), disaster management system as well as for other critical communication system. Besides IR works uses 13,116 data circuits that power its various data and voice networks across the country.

Railways have also established its Multi-Protocol Level Switching (MPLS) based Next Generation Networks (NGN) for voice traffic. This Next Generation Networks (NGN) has been used to interconnect more than 100 exchanges of Railways carrying the administrative voice traffic. Common User Group (CUG) mobile phones have also been hired to enable communication while on move to enhance safety, reliability and productivity. IR is also using 1.33 lakh VHF walkie-talkies sets to ensure safety and enhance reliability.

Telecom also plays a major role in ensuring passenger comfort. For the convenience of passengers, Train Information Boards have been provided at 1,090 Stations, Public Address (PA) Systems at 4,480 stations and Coach Guidance System at 566. RailTel Corporation is speeding the adoption of latest telecom technologies in Railways. Besides earning revenue from the spare capacity of Telecom Network of Railways, it is also modernizing the same. It has set up a state-of-the-art MPLS networks that is used for providing Internet and L3-VPN services. The Enterprise WAN of Railway-Railnet Works as an L3-VPN on this MPLS network. It has also setup STM-4, STM-16, STM-64 and DWDM networks to carry data across the length and breadth of the country. It is involved in major Government projects like National Knowledge Networks & National OFC networks thereby contributing to the growth of the nation.

Broad Band Internet accesses to passengers have been provided using two way satellite hybrid with 2G/3G and Wi-Fi. The System consists of on-board satellite tracking antenna, multiband

antenna and Wi-Fi broadcasting equipments for on-board last mile connectivity. The primary broad band link to back haul the internet traffic is established via satellite and in the event of non-availability of satellite the multi access router automatically switches from satellite to 2G/3G links to achieve 99% connectivity.

The progress of installation of telecom equipment on IR is given below:-

Installation	As on 31.3.2013	As on 31.3.2014
Railway Telephone Subscribers Lines (Nos)	3,70,412	3,83,030
Number of Control Sections provided with Dual Tone Multiple Frequency (DTMF) control equipment	322	322
Mobile Train Radio Communication System (route kilometres)		
a) GSM-R based	2,074	2,264
b) TETRA (Terrestrial Trunked Radio) based	53	53
Optical Fibre Cable Communication (OFC) system for control communication (route kilometres)	42,099	46,850
Quad Cable (route kilometers)	52,338	53,949
Digital Microwave (7GHz) (route kilometres)	4,444	2,953
Public Address System (No. of stations)	4,328	4,480
Train Display Boards (No. of stations)	1,090	1,090
Coach Guidance System (No. of stations)	558	566
Very High Frequency Sets		
a) 5 Watt sets (Hand Held) (Nos.)	1,29,019	1,33,267
b) 25 Watt sets (At Stations) (Nos.)	8,840	8,845
Very Small Aperture Terminal (V-SAT) (Nos.)	1,196	1,196
Unreserved Ticket System/Passenger Reservation System Circuits (No. of stations)	9,439	10,431
Freight Operation Information System Circuits (No. of stations)	2,008	2,093
Next Generation Networks & Exchange Circuits (No. of stations)	2,429	2,429
Railnet connections	1,11,124	1,13,325