



भारत सरकार
केन्द्रीय विद्युत प्राधिकरण
पश्चिम क्षेत्रीय विद्युत समिति
एफ -3, एमआयडीसी क्षेत्र, अंधेरी (पूर्व), मुंबई - 400 093
Government of India
Central Electricity Authority
Western Regional Power Committee
F-3, MIDC Area, Andheri (East), Mumbai - 400 093



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दूरभाष / phone: 022- 28221636; 28221681; 28220194-6

फैक्स /fax: 022 - 28370193

वेबसाइट/ website: www.wrpc.nic.in

ईमेल/e-mail: opc-wrpc@nic.in

No: WRPC/Opn/SCADA/2019-20/

Date: 13.06.2019

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To,

As per the list,

Subject:- Record notes of 1st meeting of "Operational issues in SCADA and communication system of WR" held on 26.04.2019 at WRPC, Mumbai.

Please find herewith Record notes of 1st Meeting on "Operational issues in SCADA and communication system of WR" held on 26.04.2019 at WRPC, Mumbai for your further needful.

Thanking you,

Yours faithfully

(J K Rathod)
Superintending Engineer 13/06/19

List

	Fax No.
1. Chief Engineer (L D), GETCO, Gotri	0265-2352019
2. Chief Engineer (L D), MPPTCL, Jabalpur	0761-2664343
3. Chief Engineer (L D), MSETCL, Kalwa	022-27601769
4. Chief Engineer (L D), CSPTCL /Raipur	0771-2574174
5. Executive Director, PGCIL Raipur	
6. General Manager, POSOCO, Mumbai	022-28202630
7. General Manager (WRTS-I), Powergrid, Nagpur	0712-2641366
8. General Manager (O & M), WRTS-II, PGCIL, Vadodara	0265-2487542
9. Chief Engineer (Transmission), NPCIL, Mumbai	25580741/25563350
10. Station Director, TAPS, Tarapur 1 & 2	02525-282125/244125
11. Station Director, TAPS, Tarapur 3 & 4	02525-244021/244169
12. Station Director, KAPP, Kakrapar	02626-231231
13. General Manager (OS), NTPC, Mumbai	022-28216692
14. General Manager, NTPC, Korba	07759- 237462/237552
15. General Manager (OS), NTPC, HQ-II Raipur	0771-2544550
16. General Manager, NTPC, Vindhyachal, M.P.	07805 -247711
17. General Manager, NTPC, SIPAT, CG	07752-246504
18. General Manager NTPC LARA	
19. General Manager NTPC Solapur	
20. General Manager, NTPC, Kawas, Surat	0261-2860290
21. General Manager, NTPC, Gandhar	02642-287402
22. General Manager, NTPC, Mouda	07115-281221/281219
23. CLD TPC, Mumbai	022-25541908/67175385
24. Head (O), Dahanu TPS, Dahanu	02528-222039
25. Sr V P Reliance Transmission, Pune 30471555	0124-3917982/020-
26. Vice President (Generation), Torrent Power Ltd, Ahmedabad	079-27506679
27. Executive Director, Sugan CCPP, Torrent Power Ltd, Surat.	02621-661151
28. Vice President (O & M), APL Mundra, Gujarat	02838-266364
29. Head Operation CGPL Mundra	
30. Vice President (Opn), Jindal Power Ltd., Raigarh	07767-281993/281995
31. AGM(OS) NSPCL Delhi	011-26717363, 26717366
32. GENERAL MANAGER (POWER), RGPP, Ratnagiri	02359-241071/ 241011
33. Member (Power), NCA, Indore	0731-2559888
34. Chief Engineer (PM & C), NHDC, Bhopal	0755 4030188/4030130
35. E. E. Elect. (Ponda), Goa	0832-2313780
36. Executive Engineer DD (UT), Daman	0260-2230771/2250889/2230550
37. Executive Engineer DNH (UT), Silvassa	0260-2642338
38. CEO, JSW Energy Ltd.	011-46032343/26183546
39. VP-Power Infra-Essar Hazira Surat	0261-6688498/022-67082198
40. Vice President EPTCL Hazira Surat	0261-6682747
41. COO, Korba West Power Co. Ltd. Raigarh	
42. VP(COMML) Essar Power MP Ltd MP	
43. GM Torrent power grid ltd. Ahmedabad, Gujarat	
44. Adani Power Maharashtra Ltd Tiroda	
45. CGM, R K M Powergen Pvt Ltd	
46. ED, Athena Chattishgarh Power Ltd.	
47. Head(O&M) Dhariwal Infra Ltd C'pur	
48. Head Operation Jaypee Nigree STPP-Singrauli.	
49. VP(O&M), GCEL, Chhattishgarh	
50. Head Operation DB Power, Chhattishgarh.	
51. Head operation Hindustan Power. Anuppur MP	
52. Head operation GMR, Warora Energy Ltd.	
53. Head O&M, Sterlite Grid Ltd Bhopal	
54. Head Operation Balco, Chhattishgarh.	
55. Head(O&M), SKS, SPGCL, Raigarh	
56. AVP, O&M Electrical, RIPI Amravati.	

Record notes of discussion of 1st Meeting on “Operational issues in SCADA and communication system of Western Region” held at WRPC, Mumbai on 26th April 2019 (Friday).

A meeting on Operational Issues in SCADA and communication system of Western Region held on 26.04.2019 at WRPC Mumbai. The list of participants is enclosed at **Annexure-I**.

Member Secretary, WRPC welcomed all participants from WRPC, WRLDC, SLDC Maharashtra, SLDC Gujarat, POWERGRID, WR-I, WR-II, NTPC, NPCIL and IPPs. He informed that communication system is the backbone for Power System operation. He mentioned that though some routine issues are briefly discussed in monthly OCC meetings due to paucity of time as well as inadequate presence of concerned executives related to this domain. He acknowledged that specific operational issues and concerns of the region related to SCADA and communication system can be effectively addressed in separate meeting on SCADA and communication system. He also stated that regular workshop related to SCADA and Communication is required to be organized in order to improve the system.

Further, MS WRPC informed that draft of communication standards in line with communication regulations have been uploaded by CEA on their website and requested all to review and send comments before 5th May 2019. He also stressed that as per CERC Communication Regulations 2017, communication availability is to be certified and audited by RPC secretariat. He requested all stake holders to actively participate in the discussions and work towards improving SCADA and communication system in Western Region.

SE, WRPC informed that since notification of the Communication Regulations 2017 by Hon'ble CERC, the 1st meeting for a coordinated discussion on issues

related to communication infrastructure for power system operation in WR in was conducted by WRPC on 26th Apr. 2019. He stated that there are plenty of issues related to communication to be resolved and that is why this meeting is organized. He opined that for effective deliberations there is a need for common awareness and understanding on important clauses of Communication Regulations 2017. Accordingly, he, requested WRLDC to give a presentation on Communication Regulations 2017.

GM, WRLDC said that SCADA are eyes and ears of the System Operator at Control Centre. Without uninterrupted availability of accurate SCADA data, functioning of Control Centre is severely handicapped. He also stressed that redundancy of SCADA and communication system is the key and inherent design considerations for reliable SCADA system. He further mentioned that over a period of time, due to expansion of the electrical grid, there has been a compromise on redundancy while accommodating integration of data from new elements or stations. The redundant channels and spare capacity of communication system has been utilized and presently spare channel or capacity is not available at many locations. Continuous planning and periodic augmentation/upgradation of the communication network and equipment is required to restore the redundancy and spare capacity in the system. He also stressed that for maintaining uninterrupted availability of the communication system, there is a requirement of 24x7 manning at all critical control Centre's by the respective communication system provider/vendor. He also said that Communication Regulation 2017 defines role of all utilities and all roles could be subject to audit. Consequent to 4th Amendment to DSM Regulations the availability of uninterrupted and accurate SCADA data to monitor real time deviations from schedules has become extremely important since the commercial implications have increased manifold for Zero Cross-over Violation (ZCV). In view of this it is important for every constituent to be aware of its roles and responsibilities in ensuring availability of uninterrupted and accurate SCADA data at concerned Control Centre. He stated that for the benefit of all WRLDC shall make a presentation on Communication Regulations 2017 under the 1st agenda item.

Item 1. Presentation on Communication Regulations 2017

WRLDC gave a brief presentation on CERC (Communication System for inter-State transmission of electricity) Regulations, 2017, which has been notified by Hon'ble Central Electricity Regulatory Commission and is in force since 1.7.2017 for planning, implementation, operation, maintenance and up-gradation of reliable communication system for all communication requirements including exchange of data for integrated operation of National Grid.

For a common understanding among the members, critical definitions and provisions in communication regulations were discussed. Presentation showing various provision relevant to SCADA and communication system is attached at **Annex II**

Item 2. Non redundancy of ULDC Mux at WRLDC

At present, two no. of ULDC SDH Multiplexers are provided at WRLDC premises are of Tejas and Fibcom make as per the connectivity shown in Figure 1. Due to non-availability of direct connectivity of WRLDC through OPGW path from ULDC network which is available only up to either Kalwa or Boiser, PGCIL has taken leased lines from POWERTEL/BSNL to facilitate connectivity to WRLDC. However, all the external connectivity is dropped in Tejas MUX as shown in Figure 1. Around one year back Fibcom MUX has been commissioned and same is connected in sequential manner to Tejas MUX. Hence any Supply failure to Tejas MUX leads to loss of all communication links provided on Fibcom also.

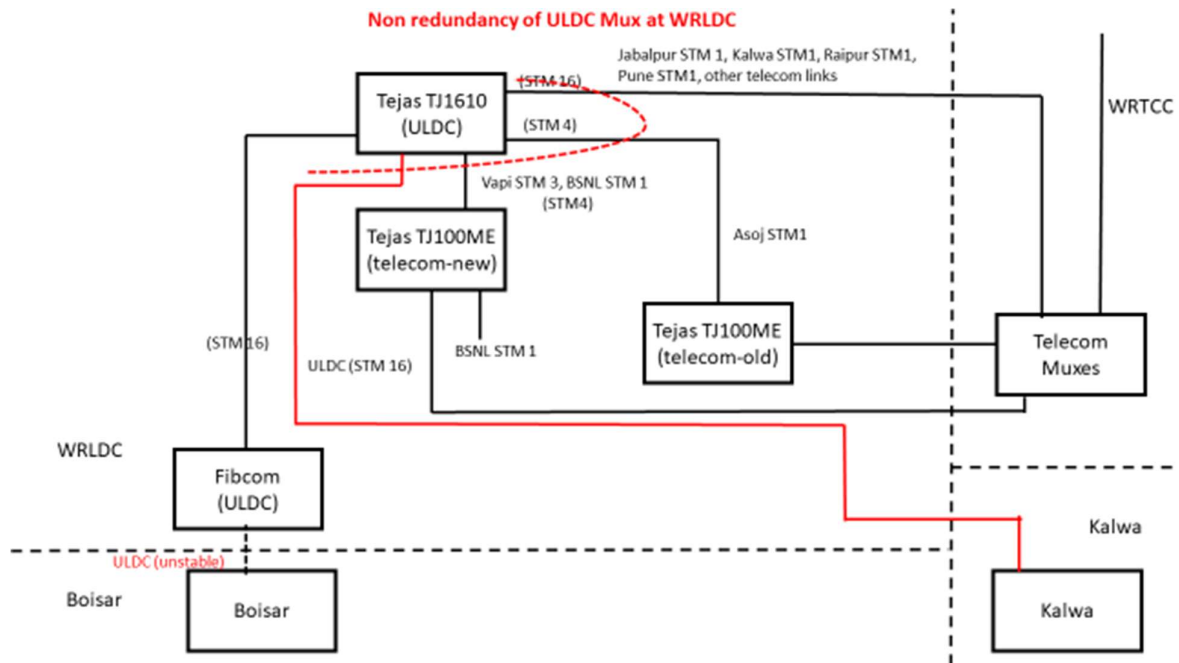


Figure 1: Optical Connectivity diagram of SDH MUX at WRLDC with rest of ULDC network

Members discussed the issue and it is emerged that another STM1 link from Pune shall be taken from POWERTEL for parallel dropping of traffic in Fipcom MUX apart from the diversion of the Asoj STM1 taken from POWERTEL.

Further, WRLDC informed that Boiser to WRLDC OPGW connectivity up to Aarey colony (now Adani after takeover from Reliance) was integrated from Boiser(PG) via Boiser (MSETCL) - Ghodbunder(Adani)-Versova(Adani)-Aarey(Adani). However, link is having high losses and the link is not usable to use link. WRLDC requested PGCIL to resolve the issues by installing Repeater/MUX at intermediate wideband nodes of Adani/MSETCL.

PGCIL informed that intermediate wideband node installation requires permission of Adani/MSETCL and after getting their approval, feasibility of same in Reliable Communication plan for WR shall be explored. PGCIL also informed that source of power through UPS is required to be provided by WRLDC. In response, WRLDC agreed to provide UPS for power supply.

WRLDC raised the concern that the logic of source selection in one direction needs to be changed so that any source of power available could be utilized

and this will make the system more reliable. In reply, CTU stated that for changing the logic, it is necessary to consult O & M for technical advice.

After detailed discussion, the following have been agreed:

- (1) WRLDC shall provide one extra source of power through UPS
- (2) CTU shall consult O & M for technical advice for changing the logic.
- (3) WRPC shall ensure participation of Adani / MSETC in next meeting.

Item 3. Inadequacy of VCGs and Ethernet ports in WRLDC ULDC MUX

WRLDC informed that currently all VCGs in WRLDC Tejas MUX is utilized even after installing two extra Ethernet cards.

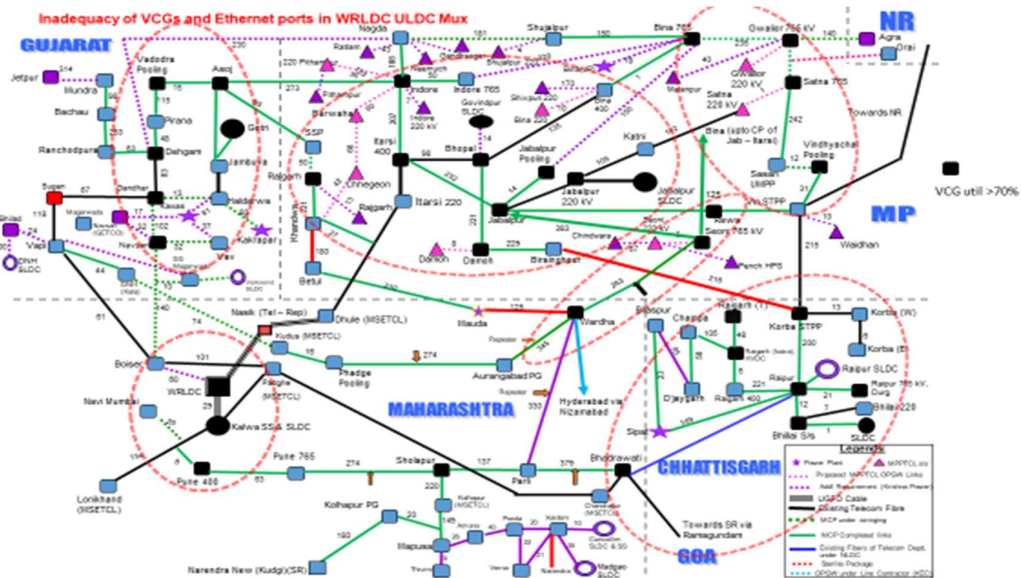


Figure 2: In adequacy of VCGs in ULDC network

Further, WRLDC informed that there is an urgent need to upgrade the MUX at WRLDC with high capacity MUX to cater to the requirements of WRLDC the regional Control center. VCGs in critical path towards WRLDC utilization is more than 70 % and same is shown in Figure 2.

Further, WRLDC informed that VCG utilization of more than 50% at any critical wideband node is a critical concern and same need to be upgraded to facilitate diversion of communication channels in case of any breakdown in between critical wideband nodes in the main communication ring towards WRLDC.

Members discussed the issue and it is emerged that utilization is more than 50% of VCGs need to be reviewed and upgraded accordingly. PGCIL agreed to review and optimize the VCGs across the network and upgrade the cards wherever necessary.

Statistics of VCG utilization is tabulated below:

ULDC MUX NODE	No.of VCG in Use	Maximum Number of VCG	VCG Utilisation Percentage	ULDC MUX NODE	No.of VCG in Use	Maximum Number of VCG	VCG Utilisation Percentage
RAIGARH TAMNAR	10	10	100	WRLDC	38	40	95
ASOJ_SDH	20	20	100	BHOPAL_SLDC	18	20	90
BHADRA WATI400	20	20	100	Raipur_400	18	20	90
BINA_765	10	10	100	Vadodara-Pooling	18	20	90
Danganिया SLDC	20	20	100	JABALPUR 765 POOLING	17	20	85
ITARSI_400	20	20	100	RAIGARH KOTRA	17	20	85
KALWA	10	10	100	Wardha_765_TJ1610	17	20	85
Navsari_GIS	10	10	100	DAMOH_400	8	10	80
PUNE_400KV	20	20	100	JABALPUR_220	16	20	80
Raipur_Pooling	10	10	100	SEONI_765	8	10	80
Rewa 400KV S/S	20	20	100	Solapur_TJ1610	16	20	80
SATNA765	10	10	100	VINDHACHAL_POOLING	8	10	80
Bhilai400 BackupSLDC	19	20	95	indore 400kv ss	16	20	80
Dehgam_TJ1610	19	20	95	BHOPAL_400	14	20	70

Gotri-SDH	19	20	95	GANDHAR_TJ1610	7	10	70
JABALPUR_400	19	20	95	GWALIOR_765	14	20	70
KORBA-STTP	19	20	95	JABALPUR_SLDC	28	40	70
Rajgrah400	7	10	70				

During the discussion, WRLDC requested to upgrade to STM 64 capacity MUX on top of current Tejas, Fibcom and REMC MUX to cater to the needs of WRLDC.

In response PGCIL informed that matter shall be taken up with LD & C, PGCIL for Design feasibility.

After discussion, it was agreed by CTU (PGCIL) to further discuss the issue of providing higher grade MUX and if need arises, MUX would be upgraded.

Item 4. Frequent outage of ULDC fiber between Kalwa-WRLDC

WRLDC informed that there is frequent outage of ULDC fibers between Kalwa and WRLDC. WRLDC further informed that Kalwa –Mumbai ULDC pair availability is poor and traffic cannot be put on this link, a sample availability calculated for 475 days and found that fiber pair is down for almost 101 days, which is about 21.3% of down time. Further, WRLDC informed that 3 pair of fibers are envisaged for Kalwa-WRLDC link, however currently only one pair of fiber is healthy.

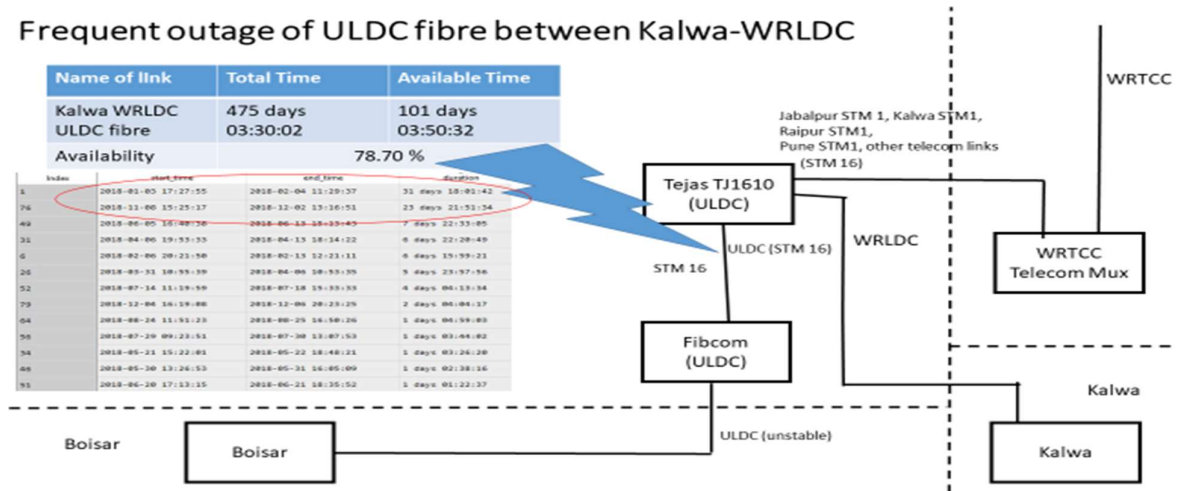


Figure 3: Kalwa –WRLDC ULDC fiber availability

In response GM, PGCIL informed that since the fiber between Kalwa and WRLDC is underground fiber, there are frequent outages due to civil works by local or private authorities. GM PGCIL also informed that they have taken Powertel links from Kalwa to WRLDC since the ring is not complete. In addition to these for protection of Kalwa, one STM1 link is taken from Asoj to WRLDC. PGCIL also informed that it will explore the possibility of providing fibers on lease.

After discussion, it was agreed by CTU (PGCIL) to explore the possibility of providing one more pair of fibers on lease from Kalwa to WRLDC.

Item 5. Redundant channels for Substations

WRLDC informed that in the recent outage of Rajgarh-Khandwa due to tower collapse, the telemetry of Khandwa was down. The following critical substations do not have redundant communication path which adversely impacts system operation:

1. Rajgarh
2. Betul
3. Khandwa
4. Damoh

This issue was discussed with PGCIL in a recent meeting on 24th April 2019 and it was agreed that PGCIL will provide communication of these substation up to Wardha Terminal Server following which there will be two paths from these substations to WRLDC.

After discussion, participants requested CTU (PGCIL) to provide communication of above four substations up to Wardha Terminal Server

Item 6. Provision of additional port in 104 Gateways for communication with Backup WRLDC

WRLDC informed that the gateways at following locations do not report to Backup WRLDC due to non-availability of ports in gateways at site:

WR-I	WR-II
765kV Padghe	765kV Vadodara
765kV New Parli	400kV Rewa
765kV Warora	765kV Banaskantha

Champa HVDC stg. 1 and stg. 2	765kV Bhuj
	400kV Bachau

PGCIL informed that out of the above since 765kV Padghe and 400kV Bhachau have capability in reporting IEC- 60870-5-101 protocol, accordingly these RTUs data from these substations are reporting to Backup WRLDC in IEC- 60870-5-101 instead of IEC- 60870-5-104. For rest of the substations, PGCIL requested adequate time as the integration shall require procurement of equipments.

Item 7. Daily reporting of ULDC links to WRLDC

WRLDC informed that reporting of ULDC links is not made available on daily basis. PGCIL informed that Tejas team is instructed to send the daily status of links of Western region to WRLDC and WRPC Secretariat. PGCIL shall ensure the continuity of the reporting status to all concerned.

Item 8. Communication between Backup SLDC of Maharashtra and Backup WRLDC

WRLDC informed that the data exchange between Backup WRLDC and Backup SLDC of Maharashtra is still pending in spite of Maharashtra giving assurances in OCC meetings. WRPC requested Maharashtra for the status and expected completion. MS WRPC requested MSETCL for giving the exact status and difficulties in facilitating communication link, and also stressed upon a timeline to be provided. He also requested MSETCL to adhere to the timeline.

Representative from Maharashtra informed that ICCP functionality at Ambazari is tested and link provision from Ambazari to Kalwa shall be configured and made available to PGCIL and PGCIL has been contacted for providing necessary connectivity between Kalwa to Backup WRLDC. MSETCL mentioned that reporting of real time data from Ambazari to Backup WRLDC shall be implemented by 4th May 2019.

After discussion, MSETCL agreed to ensure real time data from Ambazari to Backup WRLDC by 4th May 2019

Item 9. Additional Agenda by Constituents

GETCO:

- I. Provide the permission for availability of RTAMC Control center Data to SLDC-Gujarat

SLDC, Gujarat informed that, in case of failure of data to WRLDC, still data is available to RTAMC, same data can be made available to SLDC Gujarat for at least interface points through separate association. Further, SLDC already taken up the matter with LD&C vide ref no SLDC/SCADA/RTAMC/863 Dtd. 20-04-2019.

It is concluded by committee, that in first phase the RTAMC data will be provided to WRLDC and from WRLDC – SLDC will get the RTAMC real time data. In response PGCIL informed that RTAMC shall be able to extend the data subject to technical feasibility with LD &C and revert the same, however it shall be uniform in nature across WR.

After discussion, it was observed that there was no consensus among GETCO, CT and WRLDC and therefore it was finally decided that GETCO shall take up the issue will complete details and justification for getting RTAMC data in next meeting.

- II. Add the transmission lines as per ABT Calculation at both end Gujarat and WR and remove the Generation points from drawl calculation
WRLDC and SLDC Gujarat shall initiate necessary action in this regard.

- III. Derive the formula for adding losses in the drawl point

Matter couldn't be taken up, and GETCO requested to put up for next meeting agenda.

- IV. Provision of MFM/ABT Meter with same class accuracy of 0.2s or better as of ABT at all interstate lines flow for Separate SCADA monitoring for DSM. Permission may be granted by PGCIL / WRLDC.(Ref letter no SLDC/SCADA/671 dtd.30.03.2019)

Members discussed the extension provision and same was also discussed in OCC meeting and it is emerged that tapping meter CT/PT cores is not suggested.

- V. Cross link provision between Main and back up control center for data availability and redundancy. - Like Main WRLDC with Backup SLDC Gandhinagar and Backup WRLDC with MAIN SLDC Gujarat.

WRLDC informed that WR SCADA upgradation is having provision for Main to backup LDC parallel connection. Additional cross link and ICCP association may complicate the system configuration and create additional issues.

- VI. 400KV Dehgam-Jhanor-Bhachau-CGPL Data non-current frequently Dehgam RTU is down due to problem in RTU. Jhanor data was down due to power supply issue in MUX, Bachau problem is resolved and failures have decreased.

- VII. Provide the PMU data of power grid sub-station from WRLDC to SLDC, Gotri

WRLDC informed that, all central sector data within the geographical location of Gujarat is being extended.

- VIII. Add the PMU points in the alternate data source - whenever failure of data from RTU at WRLDC END

WRLDC informed that PMU data is being extended as alternate source.

- IX. ICCP Server issue at WR and Guj end

GE is working on the issue.

- X. Provide the details of power grid sub-station where PMU is going to be install in future

PGCIL to intimate.

- XI. The VC facility in Control room - between GUJ and WR main control center

Need to explore through Unified Conference (UC) facility instead of Video Conference.

XII. Next SCADA system planning and status

Agenda was not discussed due to paucity of time and GETCO requested to put up for next meeting agenda.

XIII. Provide the upcoming power grid substation list with bay number of feeder - without correct bay number WRLDC is not providing code for charging

Agenda was not discussed due to paucity of time and GETCO requested to put up for next meeting agenda.

XIV. Scheduling web software issues

Matter couldn't be taken up, and GETCO requested to put up for next meeting agenda.

XV. Satellite phone availability at MAIN & BACKUP WRLDC

WRLDC enquired about the budgetary requirement from GETCO and shall put up to management.

XVI. Communication between Main GETCO SLDC with WRLDC on ISD Protocol instead of ICCP

WRLDC informed that ICCP is an established protocol since last two decades, and GETCO SLDC is already connected through ICCP.

XVII. Provide alternative ADS point of PMU data in SCADA systems from URTDSM systems for maximize data availability at WRLDC & respective SLDC. Like 765 Vadodara Substation and other location. (PMU data can be used in SCADA as back up data

WRLDC informed that PMU data is being extended as alternate source.

XVIII. Take up the matter with M/S GE for frequent failure of URTDSM systems, Gujarat drawl calculation is carried out through PMU data, it is utmost necessity to maintain availability of PMU data.

Matter couldn't be taken up, and GETCO requested to put up for next meeting agenda.

CSPTCL:

- I. In adequacy of VCGs and Ethernet ports in SLDC ULDC MUX.
PGCIL agreed to review and optimize the VCGs across the network and upgrade the cards wherever necessary
- II. Single Communication link between Backup SLDC Chhattisgarh – Backup WRLDC.
PGCIL agreed to provide alternate communication channel up to Backup WRLDC.
- III. Approved Interface Guidelines made to be available by NLDC in compliance to CERC Communication Regulation 2017.

WRLDC informed that, as per the Communication Regulations 2017, Interface guidelines need to be issued by NLDC within 60 days after publishing the CEA technical Standards for Communication System, Accordingly NLDC shall issue guidelines with approval of Hon'ble CERC which will be shared with all.

POWERGRID:

1. Replacement of ULDC Fiber:

Under Western region ULDC project, Fiber Optic Communication Network comprising of 2608 Km OPGW/UGOFC was established to support data and voice requirements of SCADA/EMS projects. Under western region ULDC project approximately 30 No. wideband nodes were established including 06 No. central sector stations. These links comprise of 23 No. central sector links (2089Km), 07 No. MPPTCL links (487Km) & 03 No. CSPTCL links (31Km) as per details given below:

Annexure-I			
S.N.	Link Name		Link length
	Start	End	
Central Sector			
1	Bhilai 400	Raipur	14
2	Raipur	REG1 (Korba STPP)	75
3	REG1 (Korba STPP)	Korba STPP	136
4	Korba STPP	REG1(Vindhya STPP)	146
5	REG1(VndhISTPP)	Vindhyachal STPP	80
6	Vindhyachal STPP	REG1 (Jabalpur 400)	143
7	REG1(Jabalpur400)	REG2 (Jabalpur400)	132.30
8	REG2 (Jabalpur400)	Jabalpur 400	138
9	Jabalpur 400	REG1 (Itarsi400)	125
10	REG1 (Itarsi400)	Itarsi 400	125
11	Itarsi 400	REG1(Indore400)	72
12	REG1(Indor400)	Indore 400	143
13	Indore 400	REG1 (Asoj)	150
14	REG1 (Asoj)	Asoj 400	148
15	Asoj 400	Gotri SLDC	12
16	Gotri SLDC	Jambuva	20
17	Jambuva	Haldarwa	62
18	Haldarwa	Vav (GEB)	66
19	Vav (GEB)	REG1(Borivali)	143
21	REG1(Borivali)	Borivali (MSEB)	123
22	Borivali (MSEB)	WRLDC, Mumbai	17
23	WRLDC, Mumbai	Kalwa SLDC	21
Madhya Pradesh SEB			
1	Itarsi 400	Bhopal 400	105
2	Bhopal 400	Bina 400	144
3	Jabalpur 400	Jabalpur 220	13
4	Katni 220	Jabalpur 220	111
5	Satna 220	Katni 220	109
7	Itarsi 220	Itarsi 400	4
6	Jabalpur 220	Jabalpur SLDC	2
Chhattisgarh SEB			
1	Bhilai 220	Bhilai 400	8
2	Korba East	Korba West	7
3	Korba West	Korba STPP	15

M. Jayant

Further above links are under commercial operation since February 2006 with commissioning completed in phased manner from 2002-2006. As per the commercial regulations, age of communication system is taken as 15 years. As these links were among the first connecting link for successful reporting of data/voice to WRLDC, they are among the most critical forming main backbone. It is proposed to consider them for replacement at appropriate level of WRPC.

2. Replacement of RTUs:

16No. RTU were commissioned in central sector stations in Western region under “EMS/SCADA package for western region system co-ordination and control project” in February 2006; as these RTUs are also

due for replacement considering age of communication asset of 15 years as per regulations. It is proposed that approval may be granted by WRPC for replacement of RTUs at following POWERGRID stations:

- (i) Itarsi 400
- (ii) Jabalpur 400
- (iii) Khandwa 400
- (iv) Vapi 400
- (v) Boisar 400
- (vi) Satna 765

While NTPC/NPCIL may replace RTUs installed in their premises under same project on their own at following locations:

- (i) Kawas
- (ii) Gandhar
- (iii) Vindhyachal STPP
- (iv) Kakrapar
- (v) Tarapur Stg 1 & 2

After detailed discussion, it was decided that WRLDC shall bring this agenda with clarity, complete details and comprising demarcation of responsibility for replacement of RTUs/ ULDC fiber in WR in forthcoming OCC so that clear approval of OCC forum could be obtained and subsequently agenda could be taken up in WRPC for approval.

The meeting concluded with closing remarks of Member Secretary, WRPC. Member Secretary, WRPC once again thanked to all participants for actively participating in deliberation during the meeting.

LIST OF PARTICIPANTS FOR THE 1st COMMUNICATION MEETING AT WRPC, MUMBAI ON
26.04.2019

Sl.No.	Organisation, Name & Designation	Mobile No.	E-mail Address
I WRPC			
1	Shri A. Balan, M.S.	9483540528	ms-wrpc@nic.in
2	Shri J.K. Rathod, S.E.	9987910799	opc-wrpc@nic.in
3	Shri D.N. Gawali, E.E.	9930666765	opc-wrpc@nic.in
4	Shri P. Peddi Reddy, A.D.-I	7840894702	opc-wrpc@nic.in
II GETCo. / GSECL			
5	Shri N.H. Goswami, E.E.	9925208662	nhgsldc.getco@gebmail.com
6	Shri A.G. Rathod, Dy. Engr.	9925213181	ajendra.rathod@gmail.com
7	Shri N.A. Makwana, Dy. Engr.	9925212845	namsldc.getco@gebmail.com
III MSETCL / MSEDCL/MahaGenco/MSPGCL			
8	Shri Patel S.S., S.E	9833980238	selmkalwa@gmail.com
9	Shri M.S. Dani, E.E.	8554993391	eepacl.msetcl@gmail.com
10	Ms. Anjana Thakkar, A.E.E.	8554995041	aepactel@gmail.com
11	Shri Ambarish A. Salodkar, A.E.	8879756261	salodkarambarish@gmail.com
IV POSOCO/WRLDC			
12	Shri T.R. Ganesh, G.M.	9449599164	trganesh@posoco.in
13	Shri S.K. Saha, Sr. D.G.M.(Log)	9869082694	sksaha@posoco.in
14	Shri Rajkumar Anumasala, Mgr.	9869459106	rajkumar@posoco.in
15	Shri Sunil K. Patil, Dy. Mgr.	9869416089	skpatil@posoco.in
V POWERGRID			
16	Shri Rajendra Dubey, Sr. G.M.	8275039218	rjdubey@powergridindia.com
17	Shri Sanjoy Das, D.G.M.	9429976244	sanjoydas@powergridindia.com
18	Shri Mayank D. Shukla, D.G.M.	9873918461	mayank@powergridindia.com
19	Shri Nageswara Rao, C.M.	9911045519	nrao@powergridindia.com
VI NTPC			
20	Shri Nirav Dhruv, Sr. Mgr.	9429892361	niravdhruv@ntpc.co.in
VII NPCIL			
21	Shri T.K. Das, Maint. Eng.	9423081572	tapaskumar@npcil.co.in
VIII TATA POWER			
22	Shri T.V. Kulkarni, Sr. Mgr.	9029005603	tusharkulkarni@tatapower.com
23	Shri Rupesh M. Patil, Mgr.	9223503435	patilr@tatapower.com
IX JHABUA POWER			
24	Shri Balaji, D.M.	8427692072	r.balaji@avanthapower.com
X JINDAL POWER Ltd.			
25	Shri Ashok Kumar Singh, Mgr.	7898905263	kh.ashokumar@jindalpower.com
XI TEJAS NETWORKS			
26	Shri Pankaj Mane, Eng.	8828129364	pankajm@india.tejasnetworks.com

Communication System for inter-State transmission of Electricity Regulations, 2017

WRLDC, Mumbai

Communication System-IEGC 4.6.2

Regulation 4.6.2 of the Grid Code provides as under:

*"4.6.2. **Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision/ control of the grid by the RLDC, under normal and abnormal conditions. All Users, STUs and CTU shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches / transformer taps etc. in line with interface requirements and other guideline made available by RLDC. The associated communication system to facilitate data flow up to appropriate data collection point on CTU's system shall also be established by the concerned User or STU as specified by CTU in the Connection Agreement. All Users/STUs in coordination with CTU shall provide the required facilities at their respective ends as specified in the Connection Agreement.**"*

Communication System-Connectivity Regulations

Regulation 6 (3) of CEA Connectivity Regulation provides as under:

*"6 (3) The requestor and user shall provide necessary facilities for **voice and data communication** and transfer of operational data, such as **voltage, frequency, line flows, and status of breaker and isolator position and other parameters** as prescribed by Appropriate Load Despatch Centre."*

Clause 1.1 (c) of the "General Conditions for Connectivity" of the Procedures of CTU approved under CERC(Grant of Connectivity, Long-Term Access and Medium Term Open Access in inter-State Transmission and related matters) Regulations, 2009 provides as under:

*"The applicant or inter-State transmission licensee shall provide **facilities for voice and data communication for transfer of real time operational data** such as **voltage, frequency, real and reactive power flow, energy, status of circuit breaker & isolator positions, transformer taps and other parameters** from their station to Data Collection Point (DCP) of CTU as per IEGC. CTU shall provide access to applicant's data transfer through communication Network in case spare channels are available on mutually agreed terms. The location of DCP of CTU shall be the nearest station connected electrically where wideband communication capacity of POWERGRID is available. Additional communication system from the DCP to the concerned RLDC shall be the responsibility of CTU; however its cost shall be borne by the applicant. The responsibility of data transfer shall be that of the applicant."*

Effect on Return on Equity without data telemetry, communication system up to load dispatch centre

- Regulation 8 (30)(2)(i) of CERC T & C 2019-24 Regulation provides as under:

Return on Equity: i. In case of a new project, the rate of return on equity shall be reduced by 1.00% for such period as may be decided by the Commission, if the generating station or transmission system is found to be declared under commercial operation without commissioning of any of the Restricted Governor Mode Operation (RGMO) or Free Governor Mode Operation (FGMO), data telemetry, communication system up to load dispatch centre or protection system based on the report submitted by the respective RLDC;

ii. In case of existing generating station, as and when any of the 61 requirements under (i) above of this Regulation are found lacking based on the report submitted by the concerned RLDC, rate of return on equity shall be reduced by 1.00% for the period for which the deficiency continues;

Communication System – CERC

CERC Noted as:

- Forms as the backbone of the inter-State transmission of electricity and smooth operation of the power system.
- Transmission system as vast meshed network at the National, Regional and State level

Purpose:

- To lay down the rules, guidelines and standards to be followed by various persons and participants in the system for continuous availability of data for
 - System operation and control including
 - Market operations.
- Regulations deal with the **planning, implementation, operation and maintenance and up-gradation of reliable communication system** for all communication requirements including exchange of data for integrated operation of National Grid.

1(i) Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017

1(ii) These regulations shall come into force w.e.f. 1.7.2017.

Relevant definitions:

- 2(c) "Associated communication system" means a communication system associated with a project set up for exchange of voice/video data with load despatch centre as per Grid Code.
- "Communication Channel" means a **dedicated virtual path configured from one user's node to another user's node**, either directly or through intermediary node(s) to facilitate voice, video and data communication and tele-protection system.
- 2(f) "Communication network" means an **interconnection of communication nodes** through a combination of media, either directly or through intermediary node(s);
- 2(h) "Communication system" is a collection of **individual communication networks, communication media, relaying stations, tributary stations, terminal equipment** usually capable of inter-connection and inter-operation to form an integrated communication backbone for power sector. It also includes **existing communication system of Inter State Transmission System, Satellite and Radio Communication System** and their auxiliary power supply system, etc. used for regulation of inter- State and intra-State transmission of electricity;
- 2(i) "Control Centre" means NLDC or RLDC or REMC or SLDC or Area LDC or Sub-LDC or DISCOM LDC **including main and backup** as applicable.

Definition of communication System in different Regulations & Changes

T & C of Tariff 2014-19	T & C of Tariff 2019-24	Communication Regulations 2017
Communication System' includes communication system of Power Grid Corporation of India Ltd. covered under Unified Load Dispatch and Communication (ULD&C) scheme, SCADA, Wide Area Measurement (WAMS), Fibre Optic Communication system, Remote Terminal Unit, Private Automatic Branch Exchange, Radio Communication System and auxiliary power supply system etc. used for managing inter-state transmission of electricity;	means communication system as defined in sub-clause (h) of clause (i) of Regulation 2 of the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017;	"Communication system" is a collection of individual communication networks, communication media, relaying stations, tributary stations, terminal equipment usually capable of inter-connection and inter-operation to form an integrated communication backbone for power sector. It also includes existing communication system of Inter State Transmission System, Satellite and Radio Communication System and their auxiliary power supply system, etc. used for regulation of inter- State and intra-State transmission of electricity;

Relevant definitions:

contd..

- 2(j) "data" means a set of values of analogue or digital signal including a text, **voice, video, tele -protection, alarm, control signal, phasor, weather parameter, parameter of a machine or the power system.**
- 2(g) "PMU (Phasor Measurement Unit)" means a device which provides phasor information (both magnitude and phase angle) for one or more phases of AC voltage or current waveforms in real time.
- 2(r) "Real time operation" means **action to be taken at a given time** at which information about the electricity system is made available to the concerned Load Despatch Centre;
- 2(s) "Real time data" denotes **information relating to current operating state** of power system in accordance with system operation and control requirements.
- 2(ab) "Wide band Node" means **wide bandwidth data transmission data** with an ability to simultaneously **transport multiple signals and traffic types.**

3.0 interpretation of definitions

- Save as aforesaid and unless repugnant to the context or the subject-matter otherwise requires, words and expressions used in these regulations and not defined, **but defined in the Act, or the Grid Code or any other regulations of this Commission** shall have the meanings assigned to them respectively in the Act or the Grid Code or any other regulations.

OBJECTIVE , SCOPE and APPLICABILITY

4 OBJECTIVE:

Regulations provide for planning, implementation, operation and maintenance and up-gradation of reliable communication system for all communication requirements including exchange of data for integrated operation of National Grid.

5. SCOPE and APPLICABILITY:

- (i) These regulations shall apply to the **communication infrastructure** to be used for **data communication and tele-protection** for the power system at National, Regional and inter-State level and **shall also include the power system at the State level till appropriate regulation on Communication** is framed by the respective State Electricity Regulatory Commissions.
- (ii) All Users, SLDCs, RLDCs, NLDC, CEA, CTU, STUs, RPCs, REMC, FSP and **Power Exchanges** shall abide by the principles and procedure as applicable to them in accordance with these regulations.

NODAL AGENCY:

6. NODAL AGENCY:

- (i) The nodal agency for planning, and coordination for development of communication system for **inter-State transmission system user** shall be the **Central Transmission Utility**.
- (ii) The nodal agency for planning, and coordination for development of communication system for **intra - State transmission system user** shall be the **State Transmission Utility**.
- (iii) The nodal agency for ensuring integration of communication system at regional level **with SCADA, WAMS, Video Conferencing Systems(VCS), Automatic Meter Reading(AMR), EPABX, Tele-protection system shall be respective RLDC for ISGS, ISTS and SLDCs; and respective SLDC for State Generating Stations, distribution companies, Intra-State entities, intra-State transmission system, etc.**

7. ROLE AND RESPONSIBILITIES OF VARIOUS ORGANIZATIONS AND THEIR LINKAGES:

7.1 Role of Central Electricity Authority (CEA)

- (i) CEA shall formulate **communication planning criterion and guidelines for development of reliable communication system** for power system of India duly considering requisite **route redundancy ,capacity**, as well as requirements of smart grid and cyber security.
- (ii) CEA shall formulate and notify **technical standards, cyber security requirements** in accordance with the Cyber security Policy of the Govt of India from time to time, **protocol for the communication system for Power Sector** within the country including the grid integration with the grid of the neighbouring countries.

7(iii) Standing Committee for Communication System

(iii) CEA shall constitute and notify a Standing Committee for Communication System in Power Sector. The Standing Committee shall be responsible to:

- a. prepare **perspective plan** for communication duly considering optimal utilization of transmission assets for communication purposes having regards to the transmission planning carried out by CEA through Standing Committee on Power System Planning.
- b. carry out **periodic review** of the perspective plan.
- c. monitor and facilitate **timely completion of schemes and projects** for improving and augmenting the associated communication system along with transmission system in the power sector.

7.2 Role of CTU

(i) The CTU shall in due consideration of the planning criteria and guidelines formulated by CEA, be responsible for planning and coordination for development of reliable National communication backbone Communication System among National Load despatch Centre, Regional Load Despatch Centre(s) and State Load Despatch Centre(s) and REMCs along with Central Generating Stations, ISTS Sub -Stations, UMPPs, inter-State generating stations, IPPs, renewable energy sources connected to the ISTS, Intra-State entities, STU, State distribution companies, Centralised Coordination or Control Centres for generation and transmission. While carrying out planning process from time to time, CTU shall in addition to the data collected from and in consultation with the users consider operational feedback from NLDC, RLDCs and SLDCs.

Role of CTU

contd ..

(ii) The CTU shall plan the communication system comprehensively and prospectively for users considering the requirement of the expected nodes in consultation with Standing Committee to be constituted by CEA.

(iii) The CTU shall also plan communication system for the cross border transmission system for cross border exchange of power.

(iv) The CTU shall **integrate communication planning with transmission and generation project planning** in a comprehensive manner.

(v) The CTU shall discharge the above function **in consultation with the CEA, State Transmission Utilities, ISGS, Regional Power Committees, NLDC and RLDCs and SLDCs.**

(vii) CTU shall be the Nodal Agency for supervision of communication system in respect of inter-State communication system and will implement centralized supervision for quick fault detection and restoration. **CTU shall prepare Procedure for same and submit to Commission for approval within 60 days of notification of these Regulations.**

Role of CTU

contd ..

(viii) The CTU in consultation with STUs shall carry out the integrated planning for development of **backbone communication systems providing interfaces to wideband communication network of STUs at interface nodes.**

(ix) The CTU shall provide access to its wideband network for grid management and asset management by all users.

(x) The CTU shall extend the required support to Control Centres for integration of communication system at respective ends.

7.3 Role of National Power Committee (NPC) and Regional Power Committee (RPC):

- (i) NPC shall be responsible for issuance of the guidelines with the approval of the Commission on "Availability of Communication System" in consultation with RPCs, RLDCs, CTU, CEA and other stakeholders within a period of two months from the date of notification of these regulations
- (ii) The RPC Secretariat shall certify the **availability of communication equipment** for CTU, ISGS, RLDCs, NLDC, SLDCs based on the data furnished by RLDC.
- (iii) The RPC Secretariat shall monitor **instances of non-compliance of these regulations** as amended from time to time and make endeavour to sort out the issues in the respective region in such a way that cases of non-compliance are prevented in future.
Unresolved issues and non-compliance of any of the provisions of these regulations shall be reported by the Member Secretary of respective RPC to the Commission.
- (i) (iv) The RPC Secretariat shall be **responsible for outage planning for communication system** in its region. RPC Secretariat shall process outage planning such that uninterrupted communication system is ensured.

7.4 Role of NLDC:

- (i) The National Load Despatch Centre (NLDC) shall be responsible for **preparation and issuance guidelines** with the approval of the Commission on the "**Interfacing Requirements**" in respect of **terminal equipment, RTUs, SCADA, PMUs, Automatic Generation Control (AGC), Automatic Meter Reading (AMR) Advanced Metering Infrastructure (AMI), etc. and for data communication from the User's point to the respective control centre(s)** based on technical standards issued by CEA **within 60 days of issuance of technical standards.**
- (ii) NLDC shall be responsible for integration of the Communication system at NLDC end for monitoring, supervision and control of Power System and **adequate data availability in real-time within 60 days of the issue of the guidelines.**

7.5 Role of RLDCs:

- i. The Regional Load Despatch Centre shall be **nodal agency for integration and supervision of Communication System of the ISTS, ISGS, SLDCs and IPPs at RLDC end** for monitoring, supervision and control of Power System and adequate data availability in real time.
- ii. The Regional Load Despatch Centre (RLDC) **shall collect and furnish data related to Communication System of various users, CTU, RLDC, STU and SLDC to RPCs.**
- iii. RLDCs shall **provide operational feedback to CTU.**

7.6 Role of SLDCs:

- i. The State Load Despatch Centres shall be **nodal agency for integration of Communication System in the intra-State network, distribution system and generating stations at SLDC end** for monitoring, supervision and control of Power System and adequate data availability in real time.
- ii. SLDC shall provide operational feedback to CTU and STU.

7.7 Role of STUs

- (i) The STU shall be responsible for planning, coordination and development of reliable communication system for data communication within a State including appropriate protection path among State Load Despatch Centre, Area LDC, Sub-LDC and DISCOM LDC including Main and backup as applicable along with STU Sub- Stations, intra-State Generating Stations.
- (ii) The STU shall also plan redundant communication system up to the nearest Inter-State Transmission System wideband communication node for integration with the inter-State communication system at appropriate nodes.
- (iii) The STU shall discharge all functions of planning related to the State backbone communication system in consultation with Central Transmission Utility, State Government, generating companies and distribution companies in the State.
- (iv) The STU shall also provide access to its wideband Network for grid management by all users.
- (v) The STU shall extend the required support to Control Centres for integration of communication system at respective ends.

7.8 Role of Users:

- i. The Users including RE generators shall be responsible for provision of compatible equipment along with appropriate interface for uninterrupted communication with the concerned control centres and shall be responsible for successful integration with the communication system provided by CTU or STU for data communication as per guidelines issued by NLDC.
- ii. Users may utilize the available transmission infrastructure for establishing communication up to nearest wideband node for meeting communication requirements from their stations to concerned control centres.
- iii. The Users shall also be responsible for expansion /up-gradation as well as operation and maintenance of communication equipment owned by them.

8. BOUNDARY OF THE COMMUNICATION SYSTEM

8.1 ISTS Communication system

- i. NLDC
- ii. RLDCs
- iii. SLDCs (ISTS interconnection)
- iv. ISTS sub-stations of transmission licensee
- v. ISGS, Central Generating Stations, Solar generation plants/ solar parks and wind generation pooling stations connected to ISTS as required.

8.2 Intra-State Communication System:

- i. SLDC (State Inter-connection)
- ii. STU
- iii. Distribution Companies
- iv. State Generating Stations including renewable generators connected to State network.
- v. Sub-stations of STU and State Transmission licensees

9. PERIODIC TESTING OF THE COMMUNICATION SYSTEM

- i. All users that have provided the communication systems shall facilitate for **periodic testing** of the communication system in accordance with **procedure for maintenance and testing to be prepared by CTU within 60 days of notification of Regulations and approved by Commission.**
- ii. **Testing process for communication network security** should also be included **even for third party system** if exists in accordance with procedure for maintenance and testing to be prepared by CTU and approved by Commission.

10. Periodic Auditing of Communication System:

- The RPC Secretariat shall **conduct performance audit** of communication system **annually** as per the procedure finalised in the forum of the concerned RPC. Based on the audit report RPC Secretariat shall issue **necessary instructions** to all stakeholders to comply with the audit requirements within the time stipulated by the RPC Secretariat.
- An Annual Report on the audit carried out by respective RPCs shall be submitted to the Commission **within one month** of closing of the **financial year.**

11. FAULT REPORTING:

- i. RLDC and SLDC in case of outage of **telemeter data, or communication failure shall inform the respective user** so that the user shall ensure healthiness of its communication system. In case **outage pertains to fault in communication system of other user**, the **user shall lodge complaints for failure of the communication to the communication system owner** for quick restoration.
- ii. The communication provider shall explore the possibility for route diversion on the existing facility in close co-ordination with concerned provider in case the fault restoration is prolonged. **No separate charges shall be paid for such route diversion or channel re-allocation.** However, such rerouting shall be **discontinued once** the **original channel is restored.**

12. COMMUNICATION SYSTEM AVAILABILITY:

- All users of CTU, NLDC, RLDCs, SLDCs, STUs shall maintain the communication channel availability at **99.9% annually:**
- Provided that with back up communication system, the availability of communication system should be **100%.**

13. Cyber Security:

- i. Communication infrastructure shall be planned, designed and executed to address the network security needs as per standard specified by CEA and shall be in conformity with the Cyber Security Policy of the Govt. of India, issued from time to time.
- ii. NLDC, shall monitor case of cyber security incidences and discuss them at RPC level and take necessary action as deemed fit.
- iii. RPC shall ensure that third party cyber security audits shall be conducted periodically (period to be decided at RPC) and appropriate measures shall be implemented to comply with the findings of the audits. The audits shall be conducted by CERT-In certified third party auditors.

14. Guidelines or Procedures to be issued by different entities under these Regulations

14.1 The following entities shall be responsible for preparation, consultation and finalisation of the Guidelines / Procedure required under these Regulations:

- i. NLDC shall prepare Guidelines on "Interfacing Requirements" in terms of Regulation 7.4(i) of these Regulations.
- ii. CTU shall prepare Procedure on "Centralized supervision for quick fault detection and restoration" in terms of Regulation 7.2 and on "Maintenance and testing of communication system" in terms of Regulation 9 of these Regulations.
- iii. NPC shall prepare Guidelines on "Availability of Communication system" in terms of Regulation 7.3 of these Regulations.

14. Guidelines or Procedures to be issued by different entities under these Regulations

14.2 All the entities shall post the draft Guidelines/ Procedure on its website and invite comments from the general public and stakeholders and finalise the guidelines after considering the comments received from them. The entities, while seeking approval of the Commission, shall submit a statement indicating its views on the comments received from the general public and stakeholders.

15. Dispute resolution:

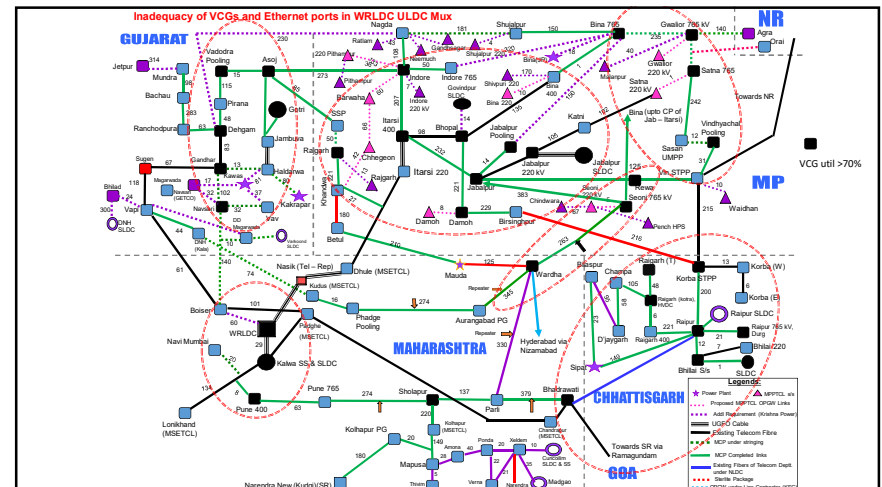
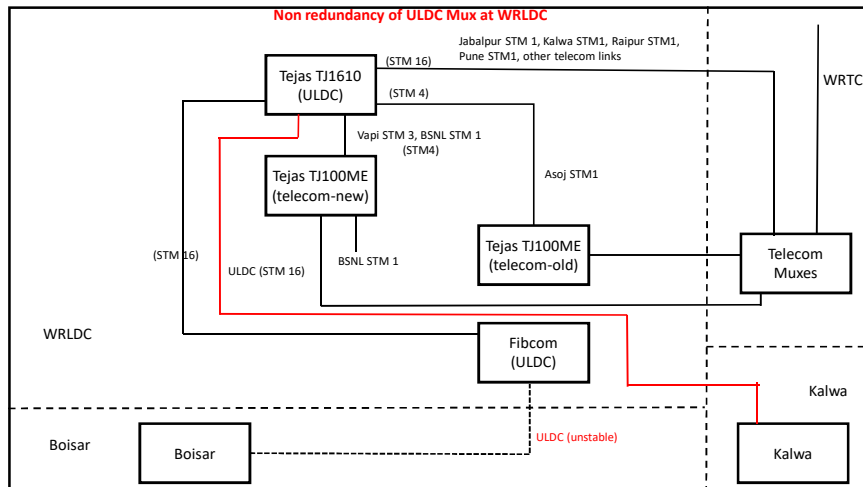
In case of any dispute in giving effect to these regulations, the affected party may approach the Commission with a proper application in accordance with Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 as amended from time to time.

16. Power to Relax:

- The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected by grant of relaxation, may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

17. Power to Remove Difficulty:

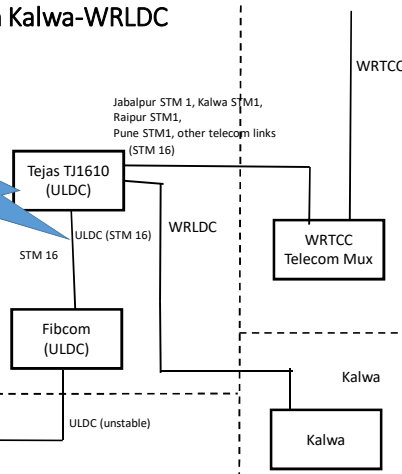
- If any difficulty arises in giving effect to the provisions of these regulations, the Commission may, by order, make such provision not inconsistent with the provisions of the Act or provisions of other regulations specified by the Commission, as may appear to be necessary for removing the difficulty in giving effect to the objectives of these regulations.



Frequent outage of ULDC fibre between Kalwa-WRLDC

Name of Inlk	Total Time	Available Time
Kalwa WRLDC ULDC fibre	475 days 03:30:02	101 days 03:50:32
Availability	78.70 %	

Index	start time	end time	duration
1	2018-01-03 17:27:55	2018-02-04 11:29:37	31 days 18:01:42
76	2018-11-08 15:25:17	2018-12-02 13:16:51	23 days 21:51:34
49	2018-06-05 16:49:38	2018-06-12 06:43:43	7 days 22:33:05
31	2018-04-06 19:53:33	2018-04-13 18:14:22	6 days 22:28:49
6	2018-02-06 20:21:50	2018-02-13 12:21:11	6 days 15:59:21
26	2018-03-31 10:55:39	2018-04-06 10:53:35	5 days 23:57:56
52	2018-07-14 11:19:59	2018-07-18 15:33:33	4 days 04:13:34
79	2018-12-04 16:19:08	2018-12-06 20:23:25	2 days 04:04:17
64	2018-08-24 11:51:23	2018-08-25 16:50:26	1 days 04:59:03
50	2018-07-29 09:23:51	2018-07-30 13:07:53	1 days 03:44:02
34	2018-05-21 15:22:01	2018-05-22 18:48:21	1 days 03:26:20
46	2018-05-30 13:26:53	2018-05-31 16:05:09	1 days 02:38:16
51	2018-06-20 17:13:15	2018-06-21 18:35:52	1 days 01:22:37



Boisar

Boisar

ULDC (unstable)

Kalwa

Kalwa

WRTCC

WRTCC
Telecom Mux

Tejas T11610
(ULDC)

Fibcom
(ULDC)

WRLDC

STM 16

ULDC (STM 16)

Jabalpur STM 1, Kalwa STM1,
Raipur STM1,
Pune STM1, other telecom links
(STM 16)