Suspension assembly

Down lead clamp

Report on Strengthening of Inter-regional & Intra-regional OPGW Communication Links for Strengthening of Eastern Region

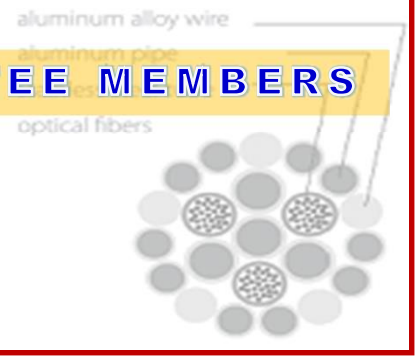
OPGW Cable

Opticla Distribution Frame (ODF)

Patch Cord

Joint Boxes

Date: 13th November 2019



Prepared by: NOMINATED COMMITTEE MEMBERS

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Preface

With the growth in Eastern Regional Grid of Indian Power system, smart technologies are being rolled out in Indian Power System for monitoring and control like AGC, SPS, Digital protection, WAMS and VoIP etc. For smooth running of these applications, it requires reliable and robust communication backbone. Therefore, in 23rd SCADA O & M meeting held on 06th March 2019, it was decided to review the communication network to find out its loopholes to strengthen the inter-regional and intra-regional OPGW back bone in Eastern Region. Accordingly committee was formed to contemplate on requirement of additional Inter-regional & Intra-regional OPGW links for strengthening of Eastern Regional OPGW network.

This report is the consensus of the committee for incorporation of additional inter-regional as well as intra-regional OPGW communication links.

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Executive Summary

Eastern Regional Grid of Indian Power System is consisting of six (06) constituents namely Bihar, Jharkhand, West Bengal, Odisha, DVC and Sikkim. These Regional Constituents including ERLDC are entrusted to ensure judicious, effective and efficient management of the transmission assets within the region and under their control, without losing the focus of national interest as well the safety, security and reliability of the other regional transmission grids, which are interconnected directly or indirectly with the Grid. Hence, for Grid Operational expediency, ISTS OPGW communication network is in place for seamless transfer of real time data, hot line voice communication, video and Power System control signal transfer from geographically dispersed sub-stations/Generating station to SLDCs/RLDCs/NLDC.

India had witnessed two massive grid disturbances on 30th & 31st July 2012 wherein major parts of Northern, Eastern & North-Eastern Regional affected. Subsequently, it was emphasized to create a back-up control centre at a different location as recommended by Intelligence Bureau. It was also emphasized to implement pan India hot line voice communication covering all generating power plants, sub-stations and control centres.

Many times, it has been felt that our inter-regional corridors are not strong enough and needs to be strengthened. So, in 23rd SCADA O & M meeting, POWERGRID came up with a proposal to strengthen the inter-regional OPGW links along with communication equipment on few important lines which are presently not having OPGW. These will also be required for alternate path / redundancy of ER grid, ER-NR, ER-SR, ER-NER and ER-WR corridors. Accordingly ERPC constituted a committee comprising of members from all state utilities, POWERGRID (ULDC), POWERGRID (LD&C), NLDC, ERLDC and ERPC who can ascertain the requirement after considering the route diversity. The scope of the Committee was assessing the requirement of OPGW link along with communication equipment for important ISTS lines in ER grid and also ER to other regions corridors for reliable communication among them. The committee would deliberate, prepare & submit the report within three months for necessary approval at TCC/ERPC.

Scope of the committee includes identification of the requirement of additional Inter-regional & Intra-regional OPGW communication links along with communication equipment for strengthening of Eastern Regional OPGW network.

According committee has deliberated on various OPGW related matter on 1st OPGW Provisioning Technical Committee Meeting, held on 14th August 2019, and 2nd OPGW Provisioning Technical Committee Meeting, held on 24th October 2019.

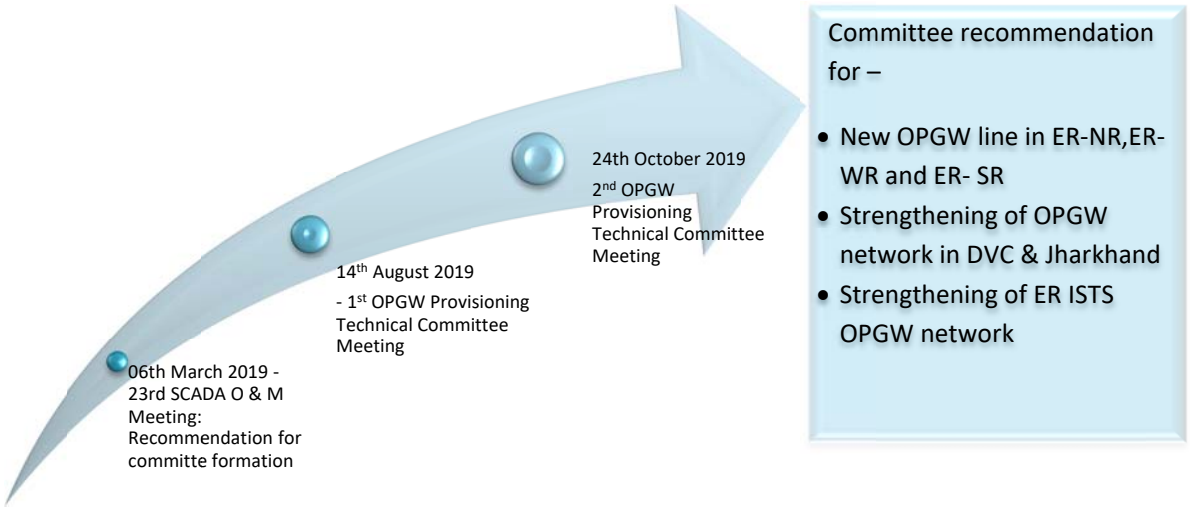

Fig 1: OPGW provisioning technical committee meeting

1. Committee Members:

As per deliberation in 23rd SCADA O & M Meeting, held on 24th August 2019, a committee has been formed comprising members from all state utilities, POWERGRID (ULDC), NLDC, ERLDC and ERPC. The list of nominated committee members is mentioned at Annexure – I.

2. Scope of the work:

The committee was constituted for deliberation and planning of following OPGW related matters -

- Assessing the requirement of OPGW link along with communication equipment for important ISTS lines in ER grid and inter-regional corridors for reliable communication among SLDCs to ERLDC, NRLDC, WRLDC, SRLDC, NERLDC and NLDC.

3. Major Findings:

There were two (02) numbers of meetings held, 1st OPGW provisioning technical committee meeting on 14th August 2019 & 2nd OPGW provisioning technical committee meeting on 24th October 2019, for detailed deliberation of OPGW link related matter of Eastern region so that communication links among SLDCs, ERLDC and NLDC could be strengthened. It was also felt that few nodes in Eastern Regional communication network require redundant path, accordingly committee came up with the following recommendation:-

A. Requirement of Communication Links between ER and other regions:

- Committee opined that existing OPGW communication links (>15 years old) may not be reliable. All such communication links in Inter-regional corridor shall not be considered for path redundancy which is ageing more than 15 years.
- Since, backup NLDC is located at ERLDC, Kolkata reliable data & voice communication from ER to other Regions is required. Higher bandwidth communication between NLDC and ERLDC is also required for SCADA, WAMS, VOIP and AGC as well in near future. In addition to the above requirement, multisite data and voice communication link between Main and Backup control centres of ERLDC, NLDC and NRLDC is configured through ER- NR corridor which is not protected as of now. Hence, for providing the communications links with adequate bandwidth and path redundancy, the committee decided to envisage the following number of communication links between ER and other regions:
  i. Three (3) numbers of communication links between ER-NR corridors.
  ii. Two (2) numbers of communication links between ER-SR, ER-WR and ER-NER corridors each.

- Committee reviewed the status of existing communication links between ER and other regions which are under implementation stage. Accordingly, the Committee has considered the following communication links between ER and other regions as mentioned below:

Sl No	Corridor	Selected lines for laying OPGW	Length (KM)	Remarks
1	ER- NR	765 kV S/C Gaya-Varanasi Line –I	265	
2		400 kV D/C Patna – Balia Line –I	195	
3		400 kV Barh-Gorakhpur Line-I	---	Under implementation, would be completed by October 2020.
4	ER - WR	765 KV S/C Ranchi – Dharamjaygarh Line-1	305	
5		765 KV S/C Jharsugada – Dharamjgarh Line-1	149	
6	ER – SR	765 KV S/C Angul - Srikakulam Line-1		Under implementation, would be completed by October 2020.
7		400 kV D/C Jeypore – Gazuwaka	221	
8	ER-NER	220 kV D/C Alipurduar-Salakati Line	---	Under implementation, would be completed by October 2020.
9		400 kV D/C Binaguri-Bongaigaon Line -1	---	POWERTEL implemented OPGW communication link in 400 kV Binaguri-Bongaigaon Line, So, 6 core could be shared for data sharing in ER-NER corridor.
		Total length of OPGW to be installed	**1135**	

Table 1: OPGW communication link for Inter- Regional corridor in Eastern Region

A. Requirement of communication links within ER:

OPGW communication links for few intra-regional stations for facilitating data communication for SCADA, PMU, AGC, VOIP, Digital Protection etc. were discussed, the followings are also recommended:-

- **400 kV D/c Nabinagar (BRBCL) Generating Station – Sasaram:** This has been considered for laying of OPGW communications links for reporting of real time SCADA data to ERLDC BCC over IEC 104 protocol & WAMS data etc.
- **220 kV Daltonganj (JUSNL) – Latehar (JUSNL) LILOed at Daltanganj (PG)**: This has been recommended for laying of OPGW communication as suggested by JUSNL. The same would be deleted from the scope if they get necessary funding from PSDF.
- **Howrah (DVC) – Howrah(WB):** Presently, OPGW communication link is not available between Howrah (DVC) to Howrah (WB). So, it is recommended to establish the communication path between these control centres. This will also help

in establishing the OPGW communication links from DVC MCC located at Andul Road to ERLDC BCC at New Delhi.

- **400 kV Farakka-Sagardighi-Subhasgram (400KV Farakka-Sagardighi-I & 400KV Sagardighi-Subhasgram TL):** 400 kV Farakka - Jeerat OPGW communication link was executed in POWERGRID Telecom package which is the main backbone of connectivity to ERLDC from the entire eastern region stations. The link is quite old & losses gradually increased in this link. So, it is recommended to establish the OPGW communication link in the 400KV Farakka-Sagardighi-I & 400KV Sagardighi-Subhasgram TL which is parallel to Farakka-Jeerat line.
- **Farakka-Purnea (400KV Farakka-Purnea under construction TL):** OPGW communication link in Farakka-Purnea link will act as redundant for Farakka-Malda & Malda-Purnea links and will add reliability in the communication network in eastern Region. So, it is recommended to establish the OPGW communication link on this line also.
- **400kV Maithan (PG) – Durgapur (WB) – Sagardighi (WB):** Presently, all real time SCADA & WAMS data and voice communication to ERLDC is through Farakka node. Hence, committee opined that the alternative of Farakka node is also to be planned and implemented, so that any contingency of Farakka node would not lead to any disruption in data & voice communications. Accordingly, it is recommended to establish the OPGW communication links through 400kV Maithan (PG) – Durgapur (WB) – Sagardighi (WB) path as alternate path of Farakka node.

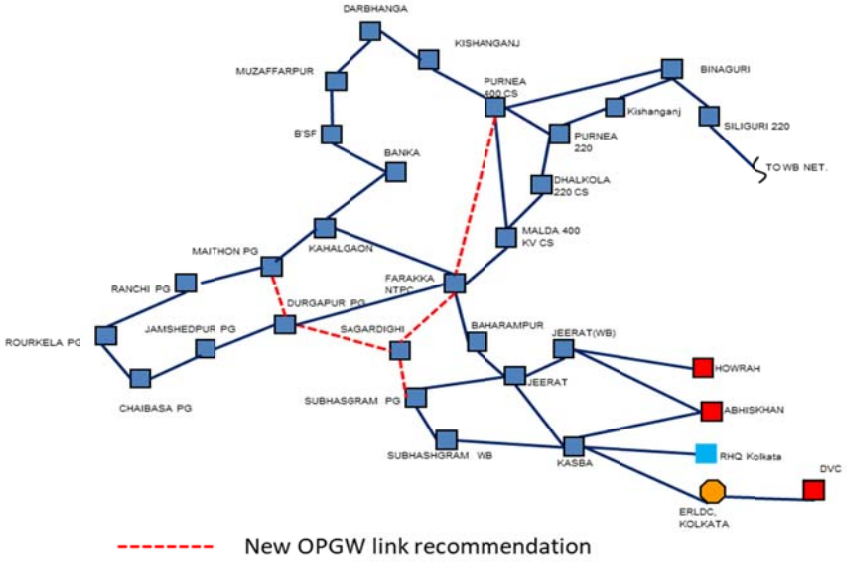

Fig 2: Alternate OPGW link for Farakka node

B. Laying of OPGW on some transmission lines of DVC control area for making alternate route to KTPS power house along with three sub-stations has been

reviewed and it is recommended to establish the OPGW communication links as mentioned below:-

Sl. no.	Line	Line Length (KM)	Purpose
1	220 KV KTPS – Giridih (Line # 251, 252)	101	To provide alternate route of OPGW to KTPS, Jamuria, Ramkanali and Purulia
2	132 KV Jamuria – Ramkanali (Line # 90)	53	
3	132 KV Ramkanali – CTPS (Line # 60)	70	
4	132 KV Purulia – Jamshedpur (Line # 39, 40)	87	
5	132 KV CTPS – Gola (Line # 6,7)	67	To reduce Bandwidth congestion in Ramgarh& CTPS area.
	Total	378	

Table 2: New OPGW link for DVC network

C. Laying of OPGW on some transmission lines of JUSNL control area for making alternate route through OPTCL & PG ULDC Network has been reviewed and it is recommended to establish the OPGW communication links as mentioned below:-

Sl. no.	Line	Line Length (KM)	Purpose
1.	220 kV Daltonganj (JUSNL) – Latehar (JUSNL) LILOed at Daltanganj (PG)	90	Alternate path for Daltanganj (PG)
2.	220 kV Jodda (OPTCL)- Ramchandrapur (JH)	130	Alternate route through OPTCL
3.	220 kV Chandil (JH)- Ranchi (PG) (up to LILO point)	90	Alternate route through POWERGRID 400/220 kV Ranchi (Namkom S/s)

Table 3: New OPGW link for JUSNL network

4. Conclusion & Recommendation:

Communication network is the backbone of SCADA system of geographically dispersed Indian Power System, and periodic review and strengthening of OPGW network is essential for fulfilling the growing requirement of reliable wide area communication with requirement of higher bandwidth. Considering the location of Back up of NLDC at ERLDC, which is required to communicate all other regions, it was decided to review the Inter-regional OPGW connectivity with Eastern region and accordingly N-1 redundant communication is proposed. ER-NR corridor is considered to be critical path since this is also used for multisite communication (communication between MCC and

BCC) for ERLDC, NRLDC and NLDC. Accordingly N-2 redundant OPGW communication is recommended. In 2016, during up-gradation of SCADA/EMS system of Eastern Region, Main Control Centre (MCC) and Backup Control Centre (BCC) were implemented and interconnectivity related matter amongst these MCC and BCC of SLDCs and ERLDC in Eastern Region was deliberated and accordingly, additional OPGW links were recommended by the committee.

Followings are the list of additional OPGW link, which are envisaged by the committee for implementation along with Communication Equipments & DCPS:-

Sl No	Corridor	Selected lines for laying OPGW	Length (KM)
1	ER- NR	765 kV S/C Gaya-Varanasi Line –I	265
2		400 kV D/C Patna – Balia Line –I	195
3	ER - WR	765 KV S/C Ranchi – Dharamjaygarh Line-1	305
4		765 KV S/C Jharsugada – Dharamjgarh Line-1	149
5		400 kV D/C Jeypore – Gazuwaka	221
6	ISTS network	400 kV D/c Nabinagar (BRBCL) Generating Station – Sasaram	82
7		400 kV Farakka –Purnea	160
8		400 kV Farakka-Sagardighi-Subhasgram	301
9		400kV Maithan (PG) – Durgapur (WB)	128
10		400KV Durgapur (PG) – Sagardighi (WB)	72
11	DVC network	220 KV KTPS – Giridih (Line # 251 , 252)	101
12		132 KV Jamuria – Ramkanali (Line # 90)	53
13		132 KV Ramkanali – CTPS (Line # 60)	70
14		132 KV Purulia – Jamshedpur (Line # 39,40)	87
15		132 KV CTPS – Gola (Line # 6,7)	67
16		Howrah (DVC) – Howrah(WB)	1
17	JUSNL	220 kV Daltonganj (JUSNL) – Latehar (JUSNL) LILOed at Daltanganj (PG)	90
18		220 kV Jodda (OPTCL)- Ramchandrapur (JH)	130
19		220 kV Chandil (JH)- Ranchi (PG) (up to LILO point)	90

Table 4: List of new OPGW link, recommended by the committee.

All constituents agreed for implementation of the above-mentioned OPGW links in Central Sector (Sl. 1 to 10) by POWERGRID. In addition, DVC also requested POWERGRID to take up the implementation of OPGW links of DVC Sector (Sl. 11 to 16). JUSNL also requested POWERGRID to take up the implementation of OPGW links of JUSNL Sector (Sl. 17 to 19).

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Annexure - 1

Nomination of committee members for Provision of OPGW along with communication equipments in Important ISTS Lines

S. No	*Name of the constituents*	*Committee Member*	*Contact Address*	*Contact Detail*
1	ERPC	Sri J. Ganesha Rao, Executive Engineer (Protection & Operation)	ERPC, 14, Golf Club Road, Tollygunge, Kolkata - 700 033	95478 91353 erpcprotection@gmail.com
2	ERLDC, POSOCO	Shri S. P Barnwal, General Manager (SCADA)	ERLDC, POSOCO, 14, Golf Club Road, Tollygunge, Kolkata - 700 033	94330 41812 spbarnwal@posoco.in
3	POWERGRID, ERTS-2, ULDC	Shri Satish Kumar Sahare, Dy. General Manager (ULDC)	POWERGRID, ERTS-2, CF-17, Action Area-1C, New Town, Kolkata - 700 156	94347 40016 uldcer2@powergrid.co.in, satishkumarsahare@powergridindia.com
4	POWERGRID, ERTS-1, ULDC	Shri Rajesh, Senior DGM (AM) & Shri Mithun Choudhury, Manager (ULDC)	POWERGRID, ERTS-1, Near Transformer Repair Works, Board Colony, Shastri Nagar, Patna - 800 023	94318 21127 (1) & 94318 15651 (2) uldcer1@powergrid.co.in, rajeshos@powergridindia.com
5	POWERGRID, Odisha project, ULDC	Shri S. K. Sahu, DGM(ULDC)	POWERGRID, Odisha Projects, Sahid Nagar, Bhubaneswar - 751 007	94330 41822 sksahu@powergridindia.com
6	POWERGRID, LD&C	Shri Manoj Kumar Singh, Chief Manager (LD&C)	POWERGRID, Tower No - I, 5th Floor, Engineers India Limited, R&D Complex, Sector-16, Gurugram - 122 001 (Haryana)	94285 11986 manojsingh@powergridindia.com
7	NLDC, POSOCO	Sri G Sudhakar, Assistant Manager (SL)	NLDC, B-09, Qutub Institutional Area, Katwaria Sarai, New Delhi - 110 016	95999 20297 gsudhakar@pososco.in
8	WBSETCL	Shri Biswajit Madhu, Superintend Engineer (Communication)	WBSETCL, Abhikshan Bhawan, Salt Lake Sector-V, Kolkata-700 091	94349 10193 cmnabhikshan@rediffmail.com
9	DVC	Shri A. K. Tiwari, Dy. CE (Communication)	DVC Tower, 9TH Floor, Ultadanga, Kolkata-700 054	94315 09389 ashok.tiwari@dvc.gov.in
10	OPTCL	Sri A.K Pattnaik, CGM(Telecom)	Technical Wing, OPTCL Head Quarters, Janapath, Bhubaneswar – 751 022	94389 07440 cgm.tel@optcl.co.in
11	BSPTCL	Sri Perwez Alam, Electrical Superintend Engineer (ULDC)	BSPTCL, 4th Floor, Vidyut Bhawan, Bailey Road, Patna - 800 001	77638 17765 perwez.bseb@gmail.com uldc.bsptcl@gmail.com a_perwez@rediffmail.com
12	JUSNL	Sri Rimil Topno, Electrical Executive Engineer (ULDC),	Jharkhand Urja Sancharan Nigam Limited,JUSNL Building, Kusai Colony,Doranda, Ranchi - 834002	98357 15518 rimiltopno@gmail.com uldc.jusnl@gmail.com
13	Sikkim	Shri Namgyal Tashi, Executive Engineer(SLDC)	Energy and power department, Sonam Tshering Marg, Gangtok - 737 101	77976 72743 sikkim.sldc@gmail.com