CIGRE Study committe D2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG D2.65

NAME OF THE CONVENOR
Geng Zhang (CHINA)

TITLE
Optical Transport Communication Networks for Electric Power Utilities

THE WG APPLIES TO DISTRIBUTION NETWORKS: **YES**

ENERGY TRANSITION
3 / Digitalization
5 / Grids and Flexibility

POTENTIAL BENEFIT OF WG WORK
1 / commercial, business, social, economic benefits
3 / likely to contribute to new or revised industry standards
4 / state-of-the-art or innovative solutions or directions

STRATEGIC DIRECTION
1 / The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-ofthe-art technological advances
2 / Making the best use of the existing systems

SUSTAINABLE DEVELOPMENT GOAL
9 / Industry, innovation and infrastructure

BACKGROUND :

Currently, the electric power industry faces the challenge of being "green, secure, and economical" and requires energy transformation, zero-carbon transformation, and digital transformation.

The all-optical communication network is based on optical fiber which is widely used in power communication systems as the most energy-saving communication technology.

Optical transport networks are a critical technology for power utilities. Many have established power communication networks based on optical transmission technologies and will likely continue to do so in the foreseeable future.

Legacy networks such as Synchronous Digital Hierarchy, some of which are built on top of optical transport networks, have long been used by power utilities. However, as the power grid transforms into a new power system through energy transition, a large number of new services require large bandwidth, wide distribution, low latency, and intelligence, which can only be met by modern technologies.

Newer optical transport networks can have the potential to reduce the migration risks from legacy technologies such as SDH.

Optical transport networks can also be integrated with IP and Ethernet packet-based networks, which are the basis of many modern power utility applications.

This work aims to investigate and provide guidance to power utilities on the various types of optical transport communication technologies, including WDM, OTN and the newer generation Elastic Optical Network (EON) technologies.

The background, standards references, comparative analysis, and use cases for power utilities for these various technologies will be covered.

We will also build on CIGRE work communication, conduct an analysis and comparison of the applicability of relevant technologies such as OTN, WDM, and MPLS, and explore the best technical route that can achieve the smooth evolution of the SDH network.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

CIGRE's most recent focus on optical transport networks was around 2013, when WG D2.35, established under CIGRE D2, began working on them.

It conducted relevant technical comparisons and evaluations of power communication network technologies. In 2015, TB 618 was completed, in which the development trends of power communication network technologies were analyzed, and relevant research was carried out on OTN and MPLS-TP.

Since then, innovations have occurred at a tremendous pace in optical transport technologies, and this working group aims to research the current state of the technology and provide recommendations on optical transport networks for power utilities.

SCOPE :

The scope of this WG is as follows:

- Provide historical background on various optical transport communication technologies, their lifecycle, current maturity, and current standards and development status.
- Provide technical coverage on the main classes of optical transport communication technologies applicable to power utilities, including OTN, WDM, and newer innovations, including Elastic OTN, Specific sub-technologies (such as C/DWDM, flexible grid WDM, flexible grid and fine-grained OTN architectures, etc.).
- Research new scenarios and new requirements of the power communication system under the background of energy transformation.
- Provide a comparative analysis of the optical transport communication networks against the power utility technical requirements, migration requirements, and use cases.
- Provide recommended use cases for the various main types of optical communication technologies for power utilities, including their suitability for integrating with other telecommunications layers such as TDM and packet-switched technologies.
- Research on global practical case studies of optical transport networks.
- Optical technology industrial practices investigation and survey.
- Reference and build on existing CIGRE work on optical networks, including “TB 618: Scalable communication transport solutions over optical networks” and the work of other standards bodies.

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee

CSE
Electra report
Future connections
Meeting
Technical Brochure and Executive Summary in Electra
Tutorial
Webinar
Work Schedule

Time schedule

Q2	2025	Gathering members and kick-off
Q2	2026	Draft TB
Q3	2026	Final TB
Q3	2026	Tutorial
Q1	2027	Webinar

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:
Rannveig S. J. Løken
April 26th, 2025