



## Reliability assessment of distribution network considering differentiated end-users demand for reliability

Shigong Jiang<sup>1</sup>, Yunfei Wang<sup>1</sup>, Dicheng Wang<sup>2</sup>, Junjie Yin<sup>3\*</sup>, Han Yan<sup>3</sup> and Jianhua Wang<sup>3</sup>

<sup>1</sup> State Grid Economic and Technological Research Institute CO., LTD., Beijing, 102209, China

<sup>2</sup> State Grid Tianjin Electric Power Company, Tianjin, 100171, China.

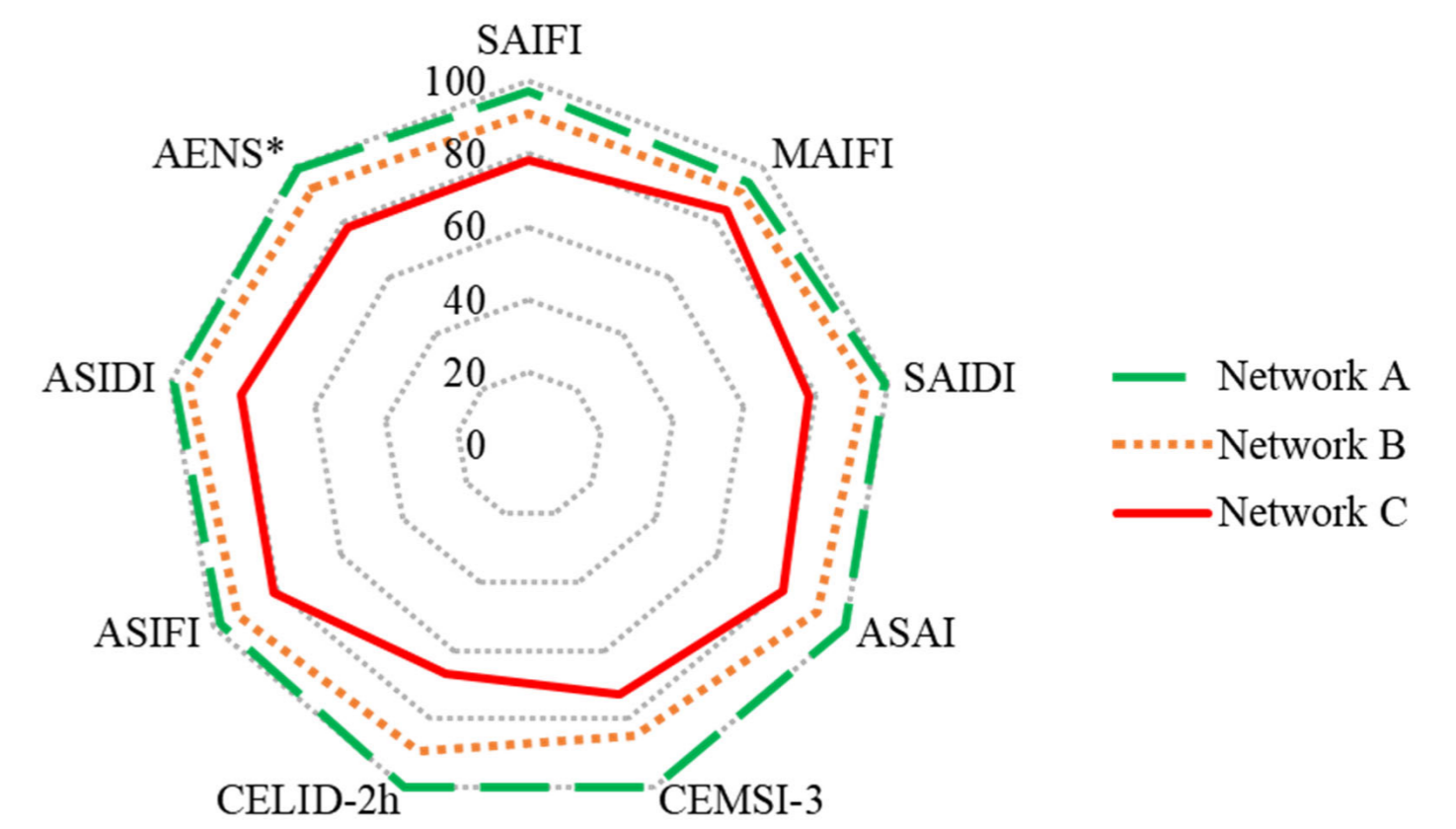
<sup>3</sup> School of Electrical Engineering, Southeast University, Nanjing, 210096, China

\*Corresponding author's e-mail: [yinjunjie@seu.edu.cn](mailto:yinjunjie@seu.edu.cn)

### Abstract

In view of the importance of the distribution network in the power system and the current problem of the fragmentation of the reliability assessment of distribution network considering differentiated end-users demand for reliability index of the distribution network, this paper proposes a **comprehensive assessment method** for the reliability of the distribution network. Based on the distribution network data obtained from the perception layer of the Internet of Things, the main assessment indices for the reliability of the distribution network based on **the power supply capacity** and **the number of users**, and the reference assessment indices for the reliability of the distribution network based on **the reliability price** are calculated respectively. Then according to the index scoring standards, the reliability assessment result of the distribution network is obtained. A case study is used in this paper to **verify** the effectiveness of the proposed comprehensive assessment method.

### Case study

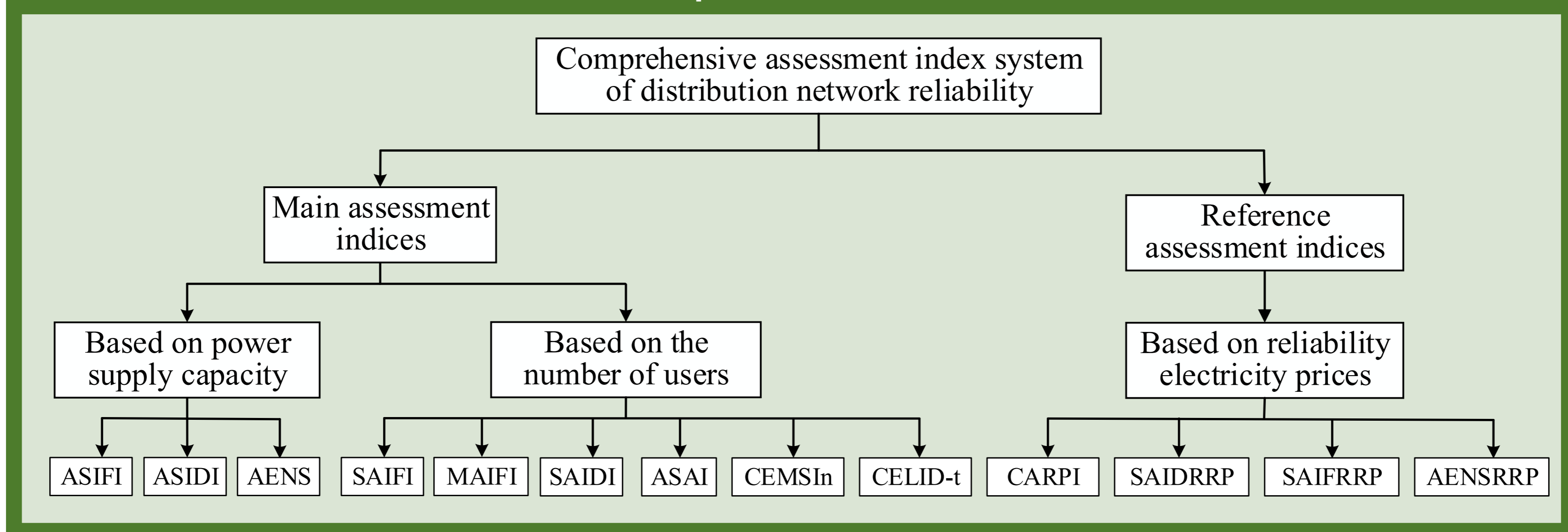


Radar chart of reliability index score of distribution network A, B, C.

### Acknowledgments

This work is supported by State Grid Corporation Headquarters Science and Technology Project Foundation under grant 5400-202012118A-0-0-00.

### Important Result



#### Assessment indices based on the number of users

- (1) System Average Interruption Frequency Index (SAIFI)
- (2) Momentary Frequency Index (MAIFI)
- (3) System Average Interruption Duration Index (SAIDI)
- (4) Average Service Availability Index (ASAI)
- (5) Customers Experiencing Multiple Sustained Interruption and Momentary Interruption Events (CEMSIn)
- (6) Customers Experiencing Long Total Interruption Durations (CELID-t)

#### Assessment indices based on the power supply capacity

- (1) Average System Interruption Frequency Index (ASIFI)
- (2) Average System Interruption Duration Index (ASIDI)
- (3) Average Energy Not Supplied Due to Interruption (AENS)LID-t)

#### Assessment indices based on the reliability price

- (1) Customers Average Reliability Price Increment (CARPI)
- (2) System Average Interruption Duration Reduced by Reliability Price (SAIDRRP)
- (3) System Average Interruption Frequency Reduced by Reliability Price (SAIFRRP)
- (4) Average Energy Not Supplied Reduced by Reliability Price (AENSRRP)



Scan code to  
get the full paper