

## **Innovation-04**

### **1. Brief Name of the innovation:**

Multiple node pair capacity related reliability (MNPCRR) evaluation of Communication Networks.

### **2. Contact Information:**

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### **3. What is the technology**

The technology is an algorithm for evaluating multiple- node pair reliability of a communication network.

### **4. What does the technology do**

This technology evaluates network reliability for given capacity requirements for various node pairs simultaneously. The links share capacity for various node pairs of the network. Therefore, simultaneous capacity requirements for various node pairs are verified by the proposed algorithm.

### **5. Explain the specific problem this technology has created to address or to solve:**

The minimum capacity transfer between specific nodes and reliability of the network are considered as the most important performance parameters of a communication network. Historically, for designing network layout, capacity and reliability are considered separately and reliability criteria considered availability of a connection between two nodes of interest only. In case of contingencies, like link or node failure, the connection criteria may still be satisfied by the network but network might fail to provide fulfill capacity requirements. To address this issue Capacity Related Reliability (CRR) was introduced. CRR is the reliability measure which considers both connectivity and capacity as success criteria for a single node pair.

The network needs to fulfill the demands not only for a single node pair but also for many combinations of node pairs. This requires sharing of resources (capacity) to meet the demands for the node pairs. Various demands might be using same resource leading to reduction in available capacities for communication between other node pairs. Hence, even if the network is designed in such a way that it meets CRR criteria for various node pairs, it may still fail to meet the demands when they appear simultaneously. The problem addressed is very complex but a simple algorithm has emerged.

**6. Why is it better? How much Better?**

It evaluates the reliability of a communication network for multiple set of node pairs for given capacity requirements. MNPCRR is defined as the probability that a communication network successfully transfers the required capacities, simultaneously, for a set of node pairs in given time period under defined environmental conditions. This method provides an advantage by considering link capacity in network reliability calculations. This method has also been improved to include node failure probabilities along with link failure probabilities in evaluating the reliability.

This approach is very new and not being used currently.

**7. Have you filed for IP? Have patent co-operation Treaty application filed?**

Not yet, but possibility is being explored for MNPCRR.

**8. What is the development stage of this innovation**

Developed an algorithm (MNPCRR) for calculating network reliability (including node failure along with link failures) considering simultaneous capacity demands for various node pairs. An optimization algorithm is being worked out which will help network designers to design a network optimally for reliability and capacity within available budget.

**9. Have any prospective users or buyers shown interest in this technology**

Not right now. This approach is not being used as it is new.

**10. Who do you consider competitors or competing technology**

This approach can be utilized by network designers for designing network layout.

**11. List the milestones remaining to be accomplished to bring your technology to full development and ready for the intended end-user?**

An efficient optimization algorithm will improve applicability of the proposed method.

**12. Broad Technical Specifications:**

This approach works on graph theory and requires the capacity and reliability parameters of the network components.

**13. Diagram or Pictures if any**