

ChaQra: A Cellular Unit of the Indian Quantum Network

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Abstract : Major research interests on quantum key distribution (QKD) are primarily focussed on increasing 1. point-to-point transmission distance (1000 Km), 2. secure key rate (Mbps), 3. security of quantum layer (device-independence). It is great to push the boundaries on these fronts, but these isolated approaches are neither scalable nor cost-effective due to the requirements of specialised hardware and different infrastructure. Current and future QKD network requires addressing different sets of challenges apart from distance, key rate, and quantum security. In this regard, we present ChaQra -a sub-quantum network with core features as 1) Crypto agility (integration in the already deployed telecommunication fibres), 2) Software defined networking (SDN paradigm for routing different nodes), 3) reliability (addressing denial-of-service with hybrid quantum safe cryptography), 4) upgradability (modules upgradation based on scientific and technological advancements), 5) Beyond QKD (using QKD network for distributed computing, multi-party computation etc). Our results demonstrate a clear path to create and accelerate quantum secure Indian subcontinent under the national quantum mission.

Keywords : quantum network, quantum key distribution, quantum security, quantum information

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