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# A Criticality Framework for Resilient Communications Networks – INCOSE Telecommunications Working Group


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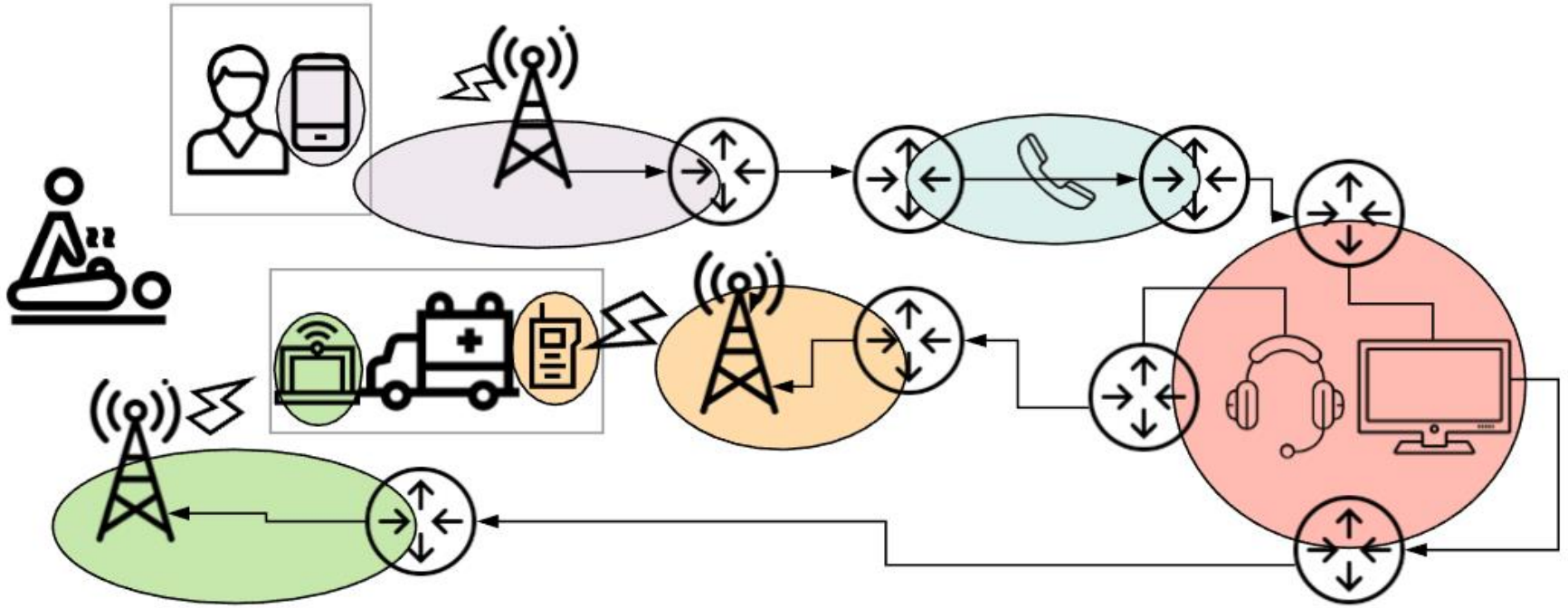
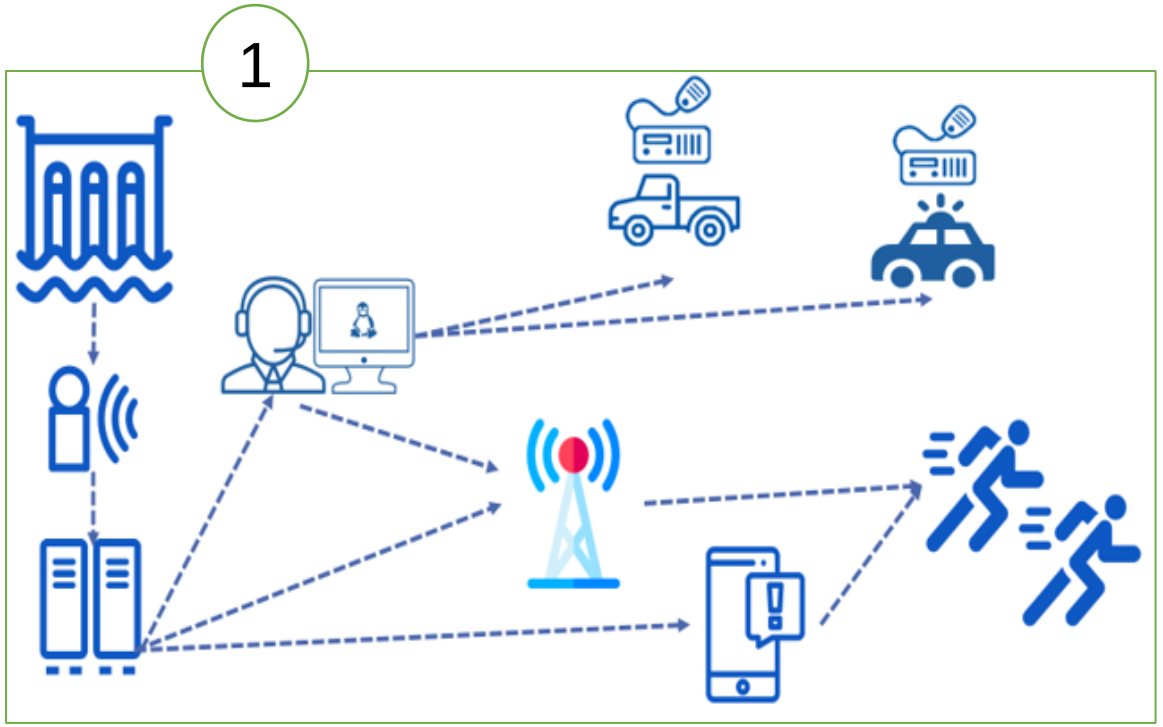
# Example: Communications Networks?

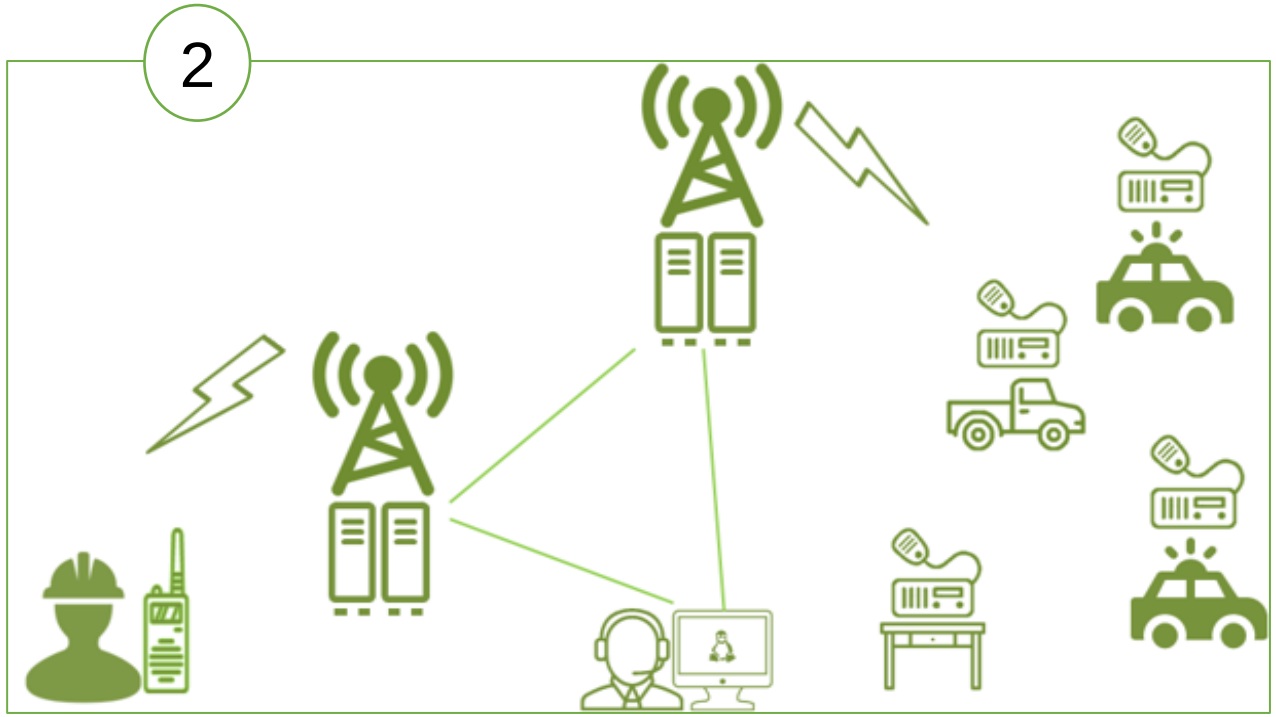


**Example:**

Emergency medical call from mobile phone service via commercial telephone system to public safety answering point to ambulance via voice radio and broadband data networks – This demonstrates multi-bearer networks in everyday occurrence

# Example: Communications Networks




## Example:

1. Dam breach flood warning system (alerts: operations department, work crews, the public)
2. Two-way radio system (public safety, utilities, transportation, etc.)

Manley, T., Ronning, S., & Scheible, W. (2020). **Defining Critical Communications Networks: Modelling Networks as Systems.** *INSIGHT*, *23*(2), 36-42.

# Key Aspects of CNs

- A CN may actually be made up of a collection of contributing CNs, integrated and interacting with one another (each acting as an independent system)
- A CN may therefore be owned, maintained, and managed by different entities, all working together to transport critical information from one location to another
- Each individual system – independently and together – must be designed to withstand potential failures.

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# Challenges with Critical CNs

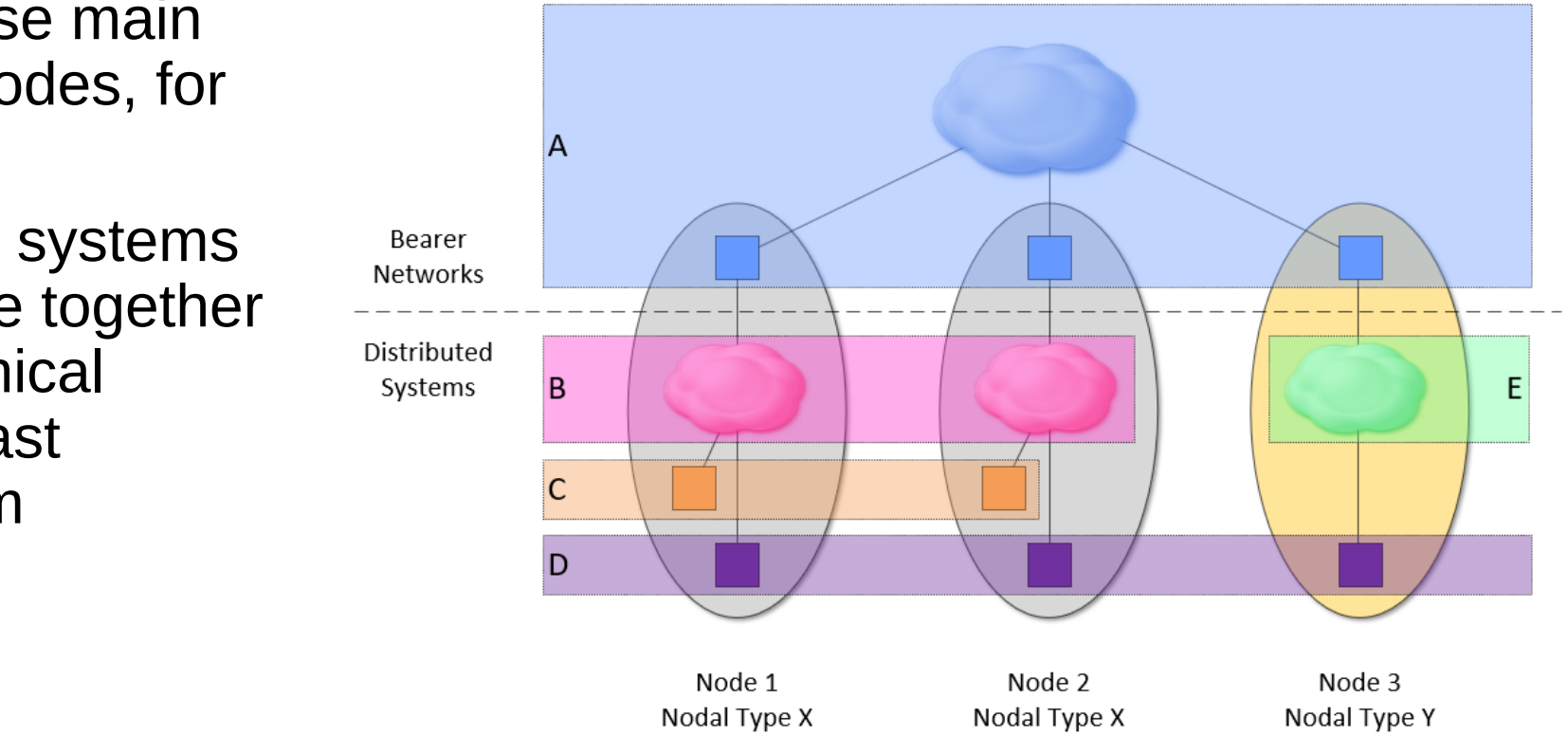
- Just like Information Technology (IT), **telecommunications** is *typically* **NOT a CORE business function**
- Communications networks ***support*** the core business
- *Old circuit-based* Operational Technology (OT) systems are converging with *new IP networks*
- ***Telecommunications practitioners*** must support the networks and systems

# Challenges with Critical CNs

- Policy makers, account managers, and business operators:
  - must apply funds appropriately to ensure the critical services are prioritized.
- System designers:
  - must consider potential adverse conditions to ensure reliable and resilient services.

# Types of CNs

- **Bearer Networks** – those functional systems whose main purpose is to connect nodes, for example, a WAN
- **Distributed Systems** – systems whose elements operate together irrespective of geographical distribution, or are at least managed as one system

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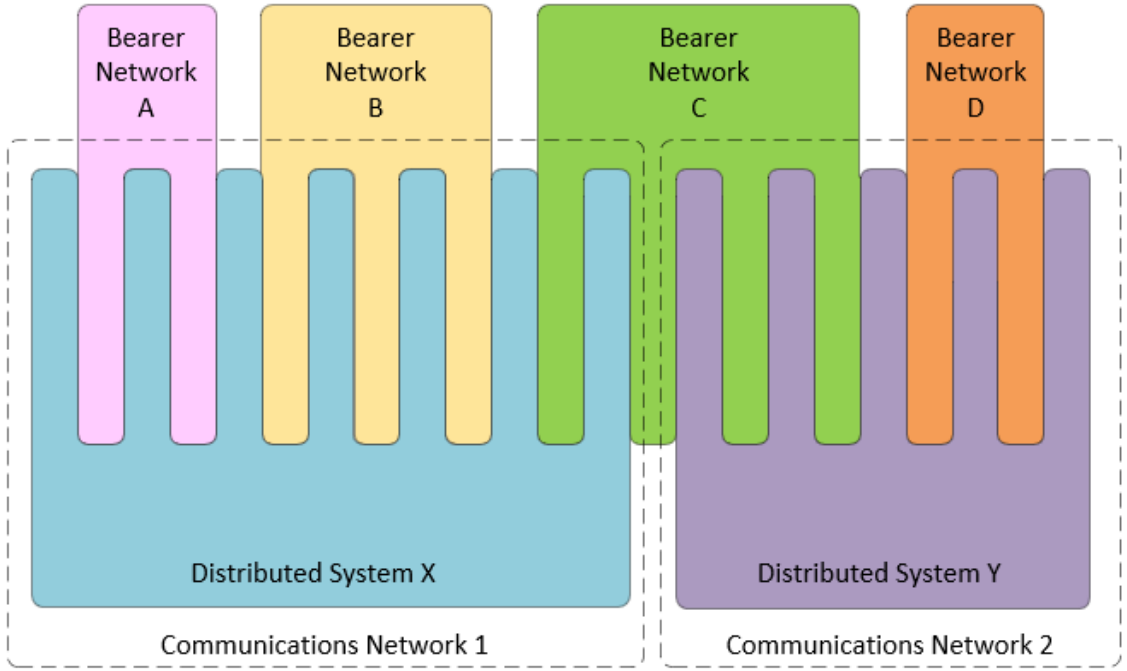
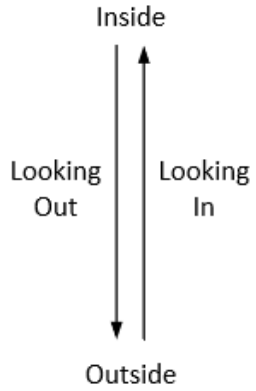
# Perspectives

- **Inside Looking Out** – the perspective of the carrier (network provider)
- **Outside Looking In** – the perspective of the enterprise (service/application)