

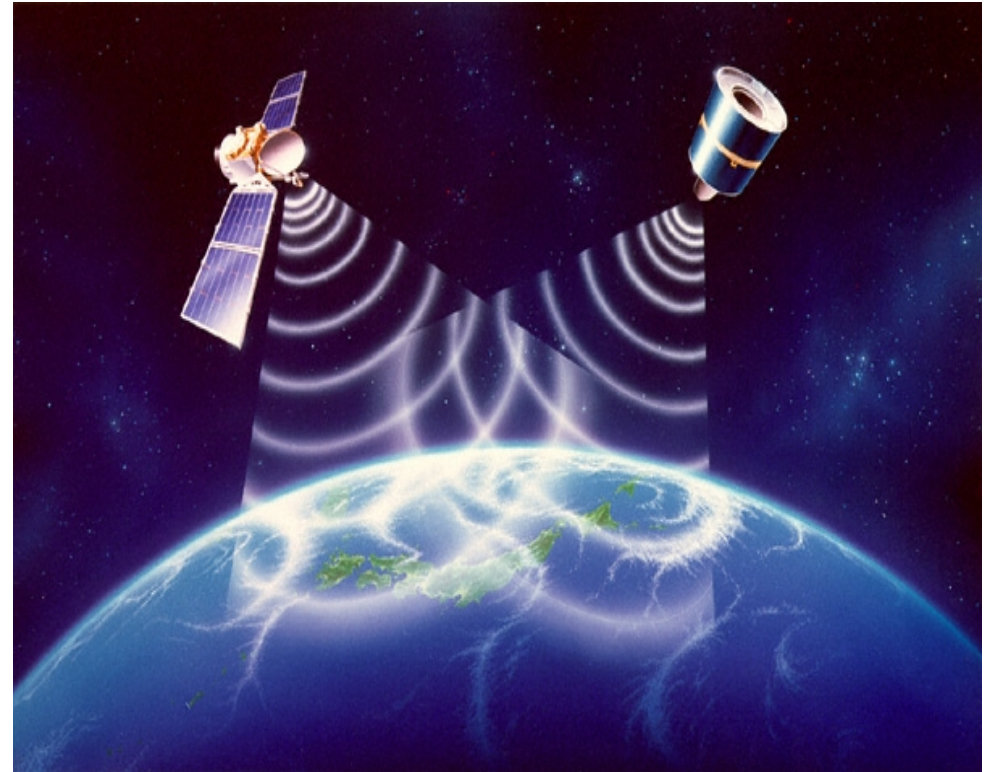
# Delay Tolerant Networking(DTN)

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# Introduction

- We all use the Internet. Reliable.
- However, some assumptions on the network structure (uptime, physical medium, latency).
- We want to extend this to “challenged networks”

# Normal vs. challenged network

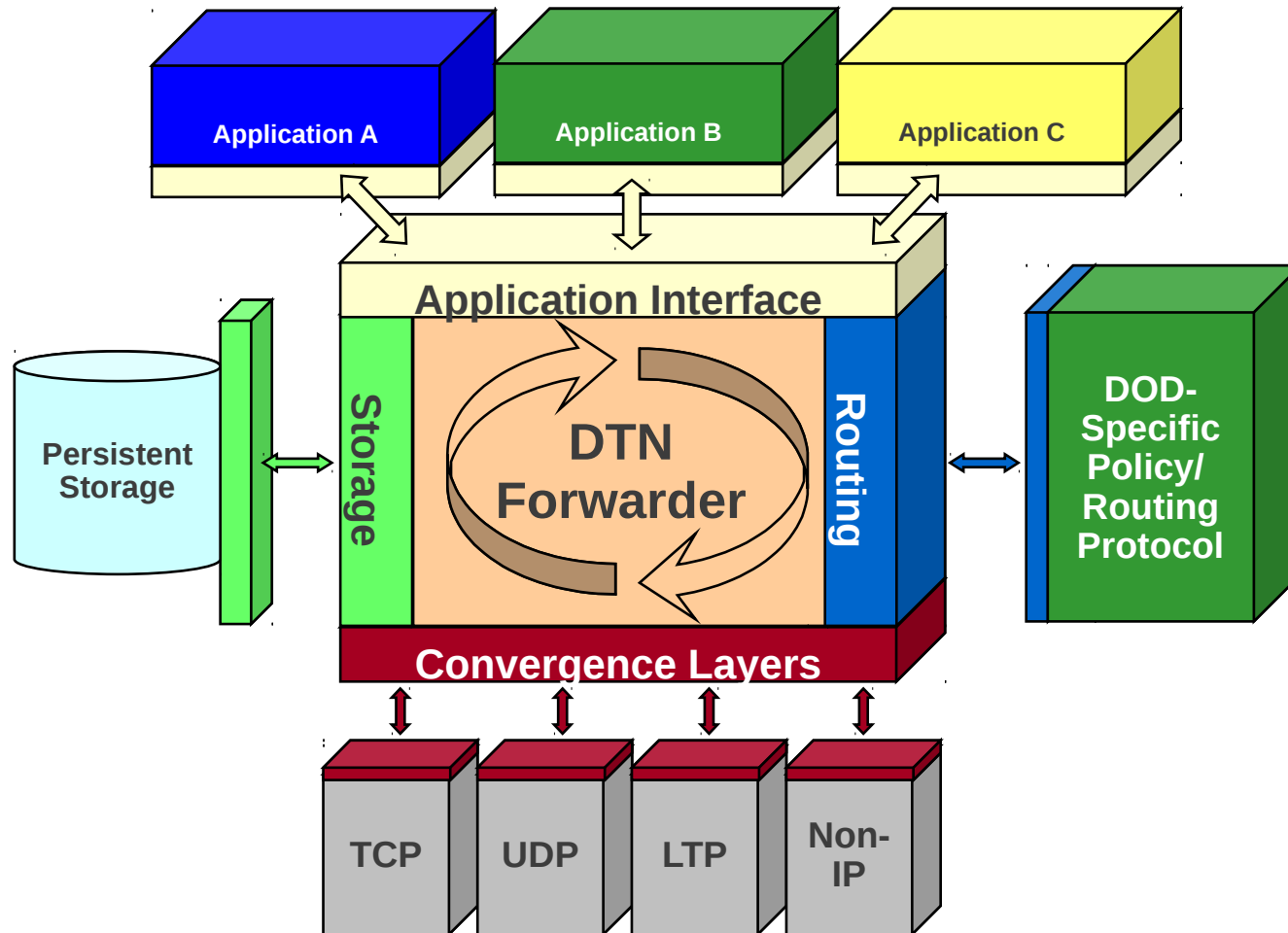


The figure on the left shows internet communication and the figure on the right shows satellite communication which is a kind of challenged network.

# Network Challenged: When?

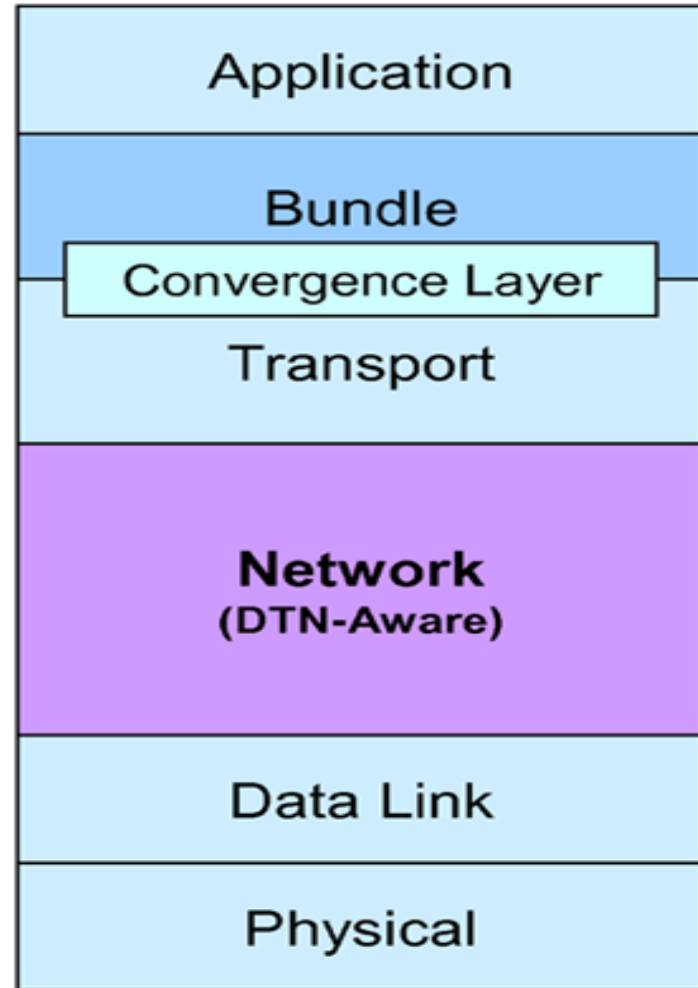
- High latency/low data rate
- Disconnection
- Long queuing times
- Interoperability considerations
- Low power requirements

# DTN Infrastructure



# DTN : Concepts

1. Operates above transport layer
2. Main Concepts
  - Bundles
  - Store-Carry-and-Forward



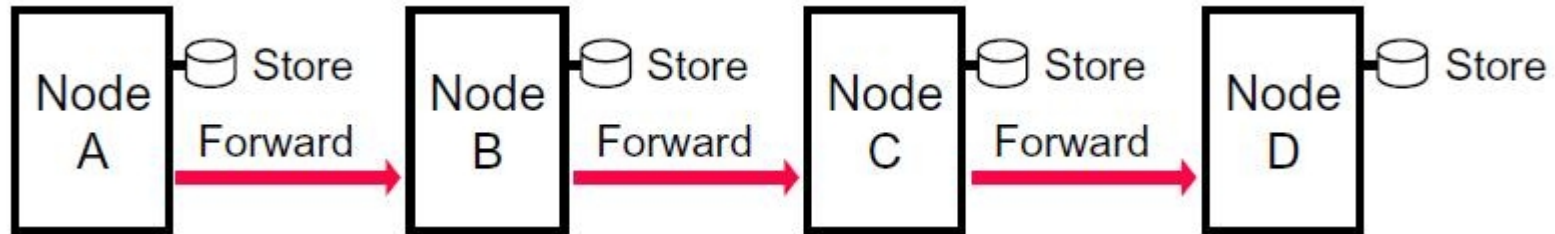
# DTN : Bundles

## Bundle

- The source application's user data
- The control information provided by the source application for the destination application which describes how to process, store, dispose off, and handle the user data
- A bundle header which is inserted by the bundle layer and can be arbitrarily long depending on the volume of the data encapsulated in the bundle layers.

## Optional ACKs

# DTN : Store-Carry-and-Forward



Store a bundle.

Forward when the next contact is available. Hours or even days until appropriate contact.

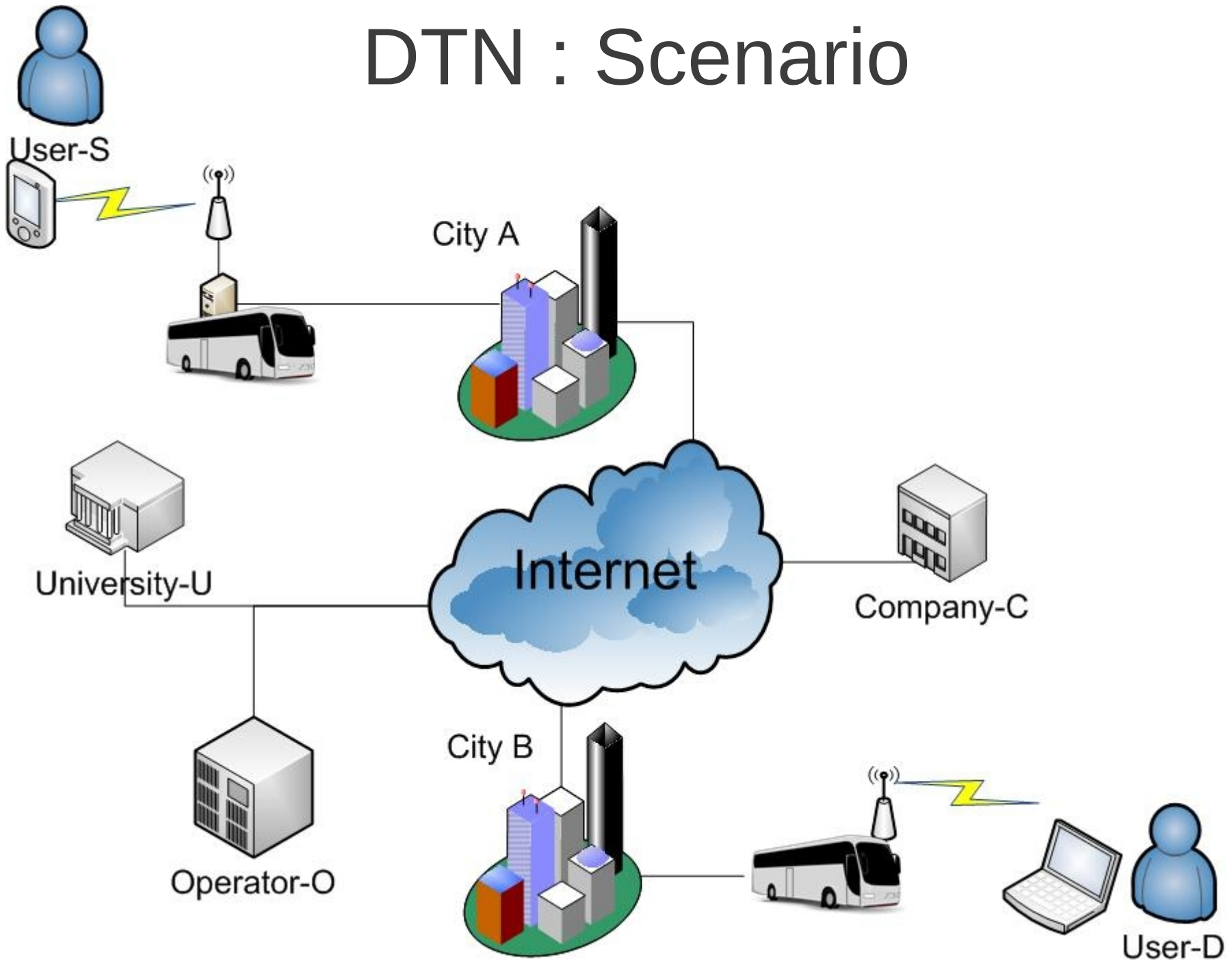
Similar to Postal system

How is this different from Internet routers' store-and-forward?

- 1) Persistent storage (hard disk, days) vs memory storage (few ms)
- 2) Wait for next hop to appear vs. wait for table-lookup and available outgoing routing port



# DTN : Scenario



# DTN : Types of nodes

- Host
- Router
  - works within a single DTN region
- Gateway
  - connects neighboring networks

# DTN : Node names

- based on URIs
- consist of region and entity ids

## **Example:**

*dnt://earth.sol.int/src.someclient.com*

# DTN : Addressing

- unicast
  - *dnt://earth.sol.int/src.someclient.com*
- anycast
  - *dnt://earth.sol.int/\*.someclient.\**
- multicast
  - *dnt://earth.sol.int/\*.someclient.\**
- broadcast
  - *dnt://earth.sol.int/\**

# Summary

- Introduction
- Why DTN?
- Overview of DTN protocol

## Resources

[http://en.wikipedia.org/wiki/Delay-tolerant\\_networking](http://en.wikipedia.org/wiki/Delay-tolerant_networking)

[http://www.nasa.gov/mission\\_pages/station/research/experiments/DTN.html](http://www.nasa.gov/mission_pages/station/research/experiments/DTN.html)