TCP interactions with BOD/DAMA Networks

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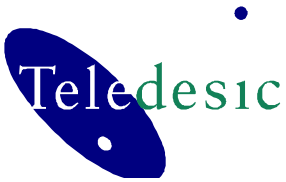
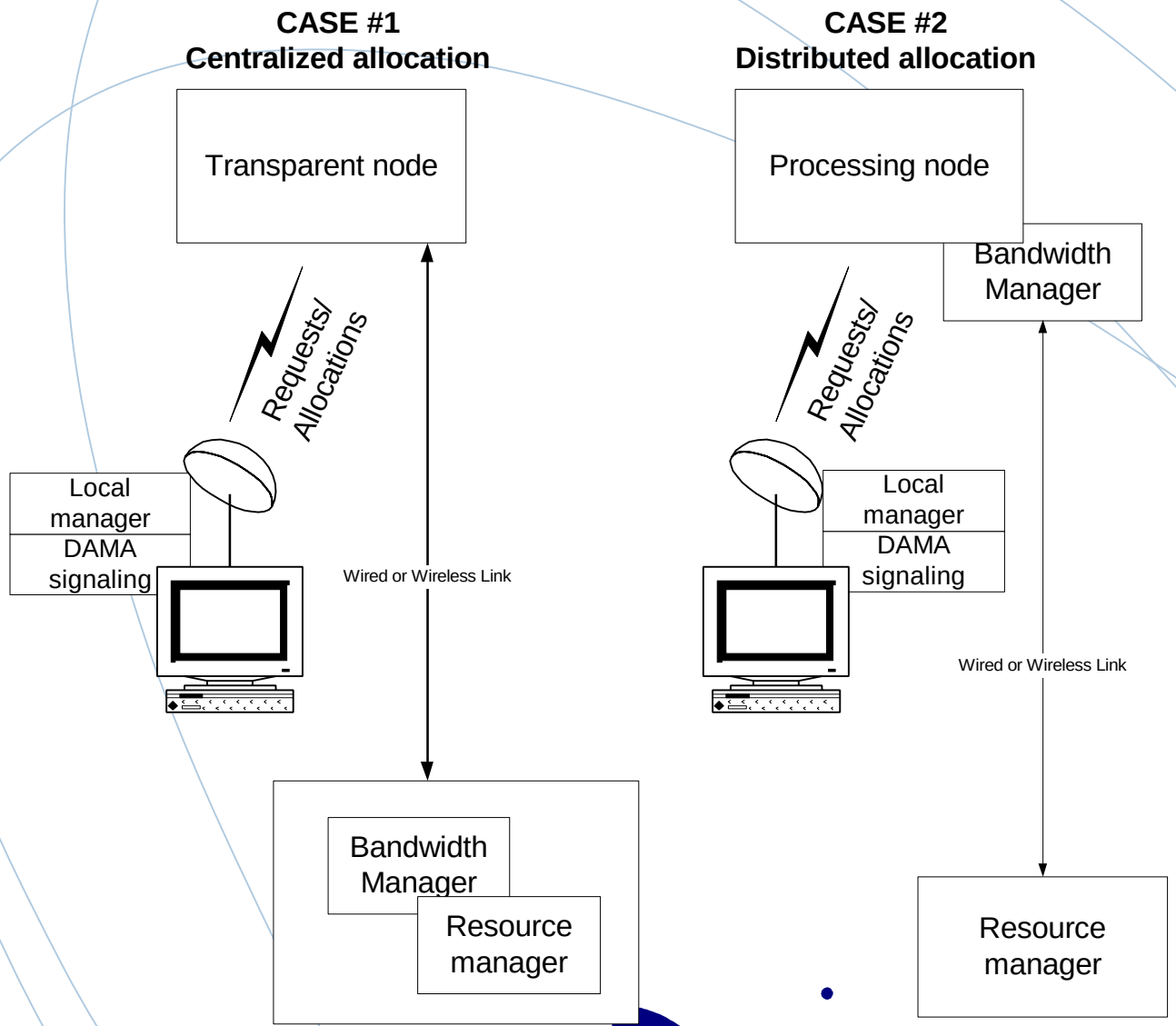


Introduction

- **Demand Assignment Multiple Access (DAMA)**
  - **Link protocol for "uplink" slot assignment in a shared channel (e.g., MF-TDMA).**
  - **Use scarce network resources effectively by adjust bandwidth utilization to actual traffic.**
  - **Commonly used in various satellite networks (LEO and GEO) and fixed broadband terrestrial wireless networks.**
- **Bandwidth on Demand (BOD)**
  - **Signaling protocol used to request DAMA slots.**
  - **Distinct from resource reservation signaling (e.g., Q.2931 or RSVP).**
  - **Time from request initiation to slot availability can range from 10ms to 500ms depending on link latency and framing structure.**

Example


CASE #1
Centralized allocation
Transparent node
Requests/
Allocations
Local
manager
DAMA
signaling
Wired or Wireless Link
Bandwidth
Manager
Resource
manager
CASE #2
Distributed allocation
Processing node
Bandwidth
Manager
Requests/
Allocations
Local
manager
DAMA
signaling
Wired or Wireless Link
Resource
manager

Interactions with TCP

- **Access delay:**
  - How long until the bandwidth is initially available (Request time + framing)
  - How long until a change of bandwidth becomes effective
- **Queuing delay:**
  - TCP/IP traffic may be queued waiting for access
- **Bandwidth Quantization**
  - Bandwidth in terms of specifics “chunks”
  - May exclude some IP packet fragments and results in delay variations

Challenges

- **TCP/IP transparency to BoD specifics**
- **Influence on:**
  - **Slow start and window sizes.**
  - **Retransmission time out.**
  - **Congestion avoidance.**
  - **Fairness between ground stations.**

Solution Space

- Defining/predicting bandwidth requirements for:
  - Non-elastic, signaled (e.g., RSVP) services.
  - Elastic, TCP-like services.
- Optimization of request/allocation delay cycle.
- Optimization of packet/fragment transmission.
- DAMA interaction with congestion control (through interaction with mechanisms like ICMP, ECN, RED).