TRIGTRAN Problem Statement

draft-dawkins-trigtran-probstmt-00.txt

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Problem Statement Topics

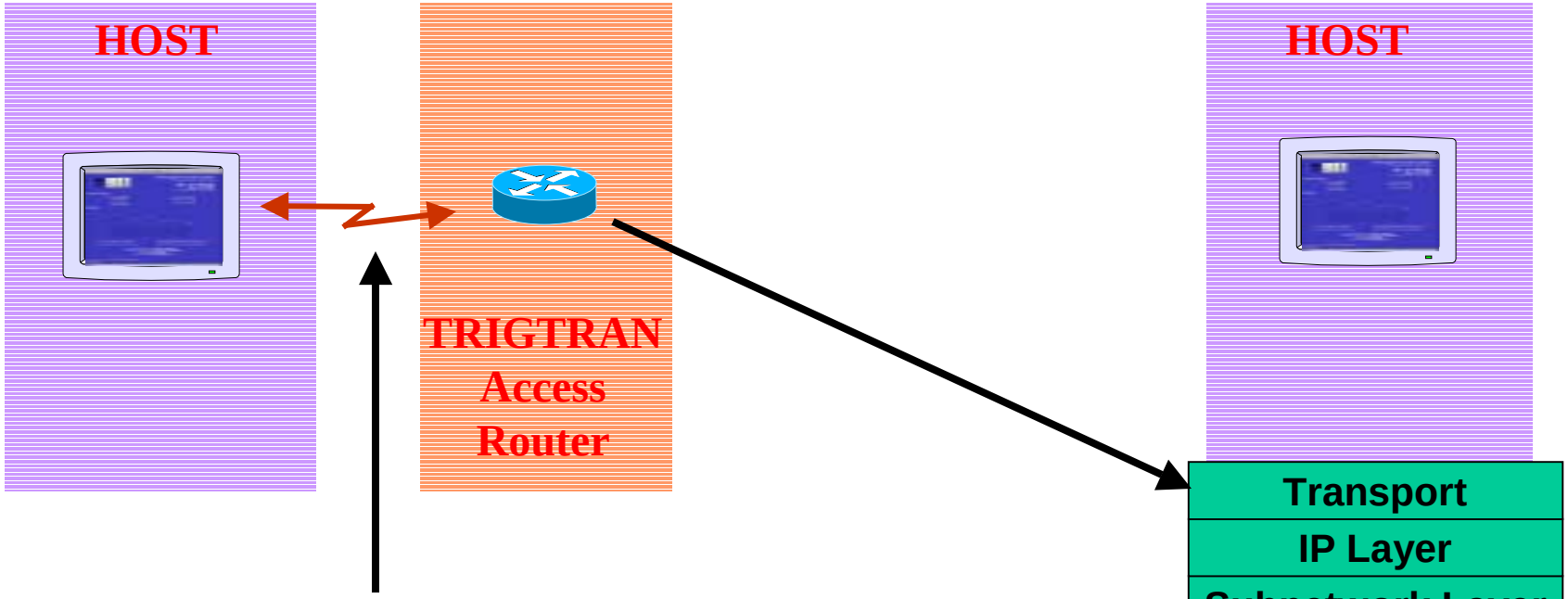
- Why do we think there's a problem?
- Minimal TRIGTRAN Strawman Architecture
- Partial TRIGTRAN Deployment
- TRIGTRAN Basics
- Security Considerations

What's The Problem?

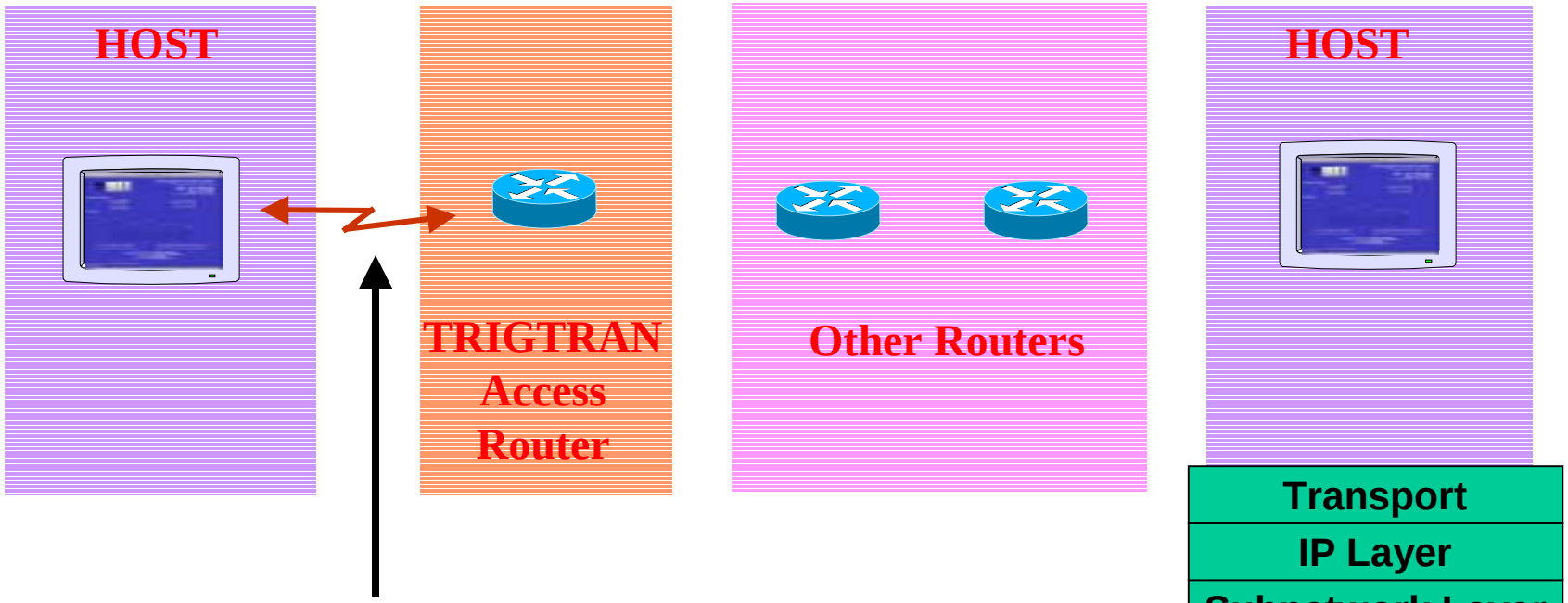
- End to end mechanisms work
  - … and we're not going to change them
- We're looking at paths with
  - Long – multi-second – RTTs
  - Transmission errors, not (just) congestion losses
  - Painful to lose a packet and retransmit
- Today's TCPs
  - Use multiple RTTs for end-to-end mechanisms
  - Can't tell the difference between errors and congestion
  - Run at a fraction of line speed on links with errors
- Can subnetworks provide hints that help TCP?

Minimal TRIGTRAN Strawman Architecture

Minimal TRIGTRAN Strawman Architecture



TRIGTRAN supported by Some, But Not All, Routers



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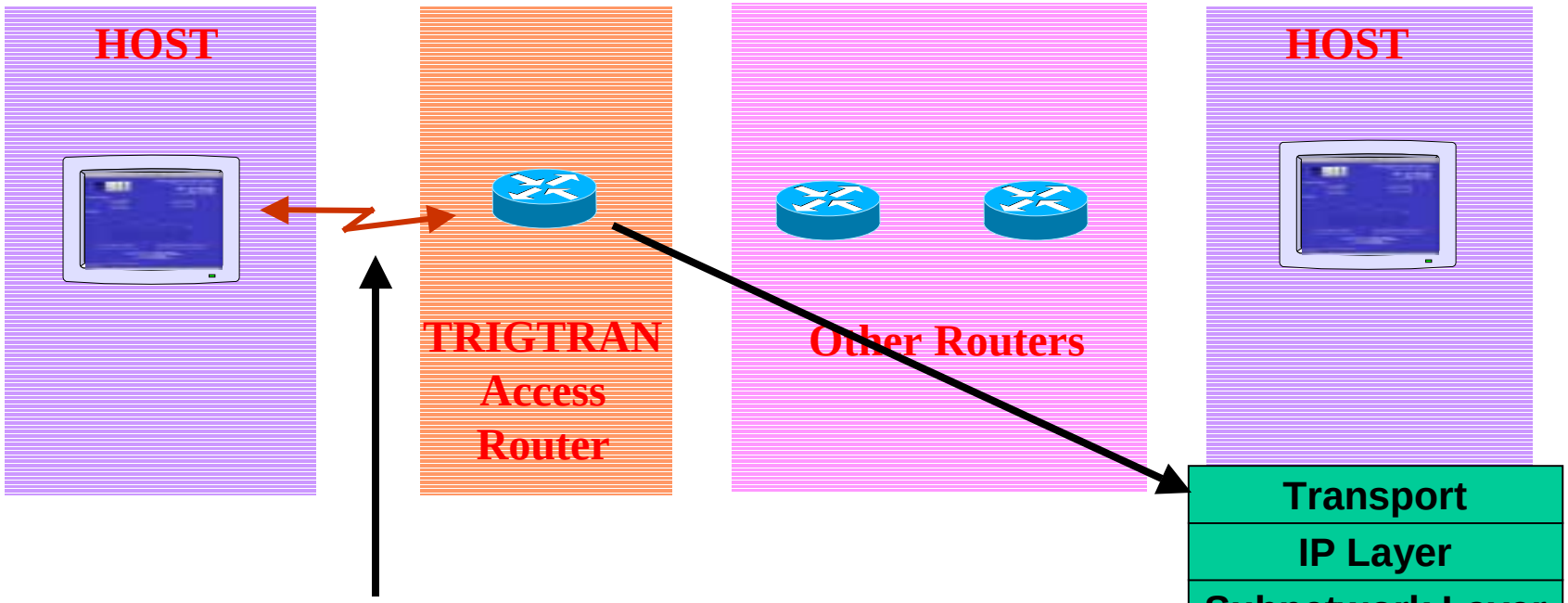
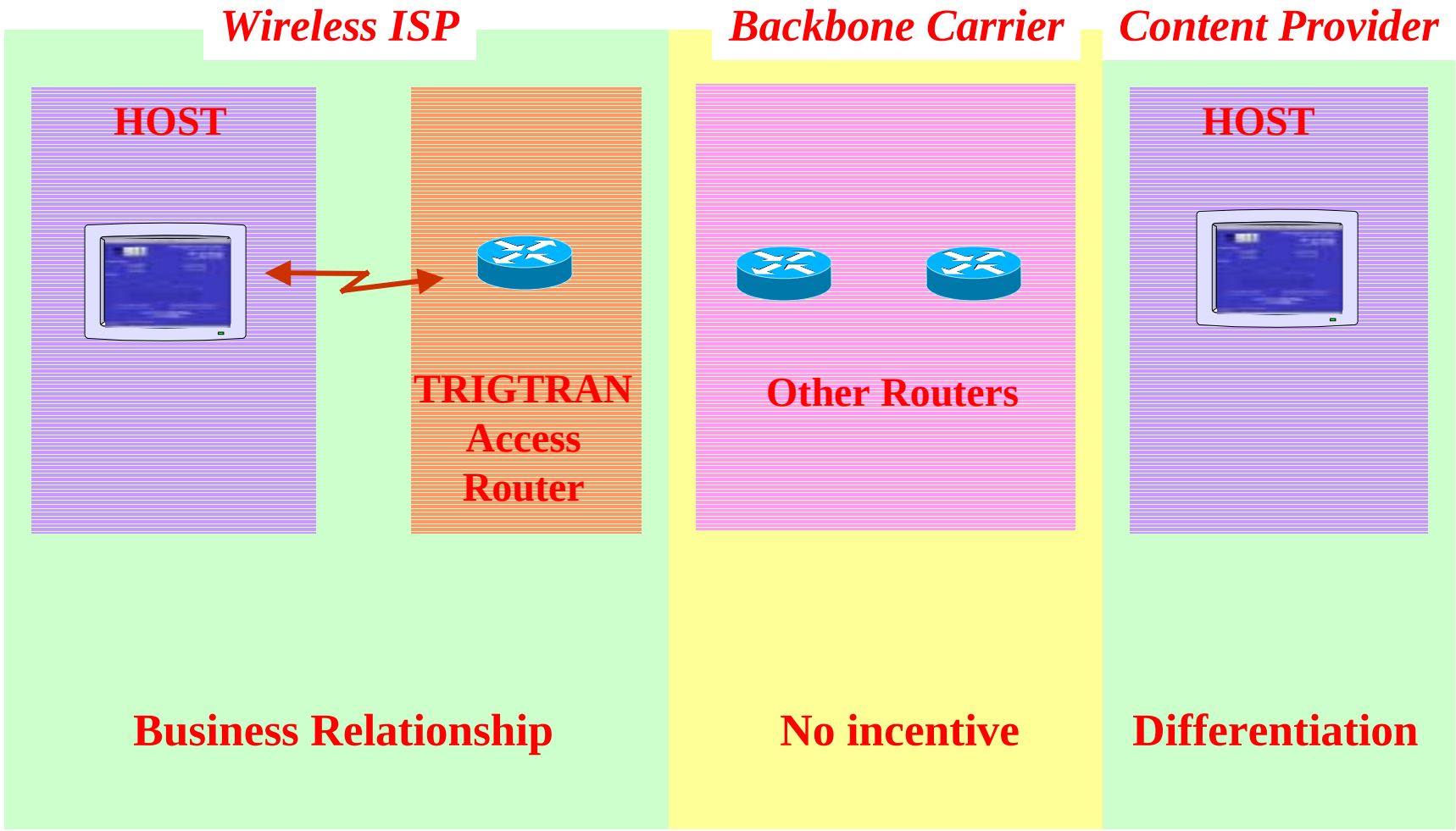


Incentives for Deployment?



What events cause notification?

"An event may not be applicable to every type of subnetwork, but it MUST NOT be technology-specific." – from the draft

- **Minimal set of TRIGTRAN events:**
  - **"link up" / "link down" events**
  - **Routing protocols have propagated these events for decades**
  - **Transports may care about "intermittent connectivity"**
- **Additional TRIGTRAN events**
  - **Packets discarded by subnetwork, not lost due to congestion**
  - **Sub-network path changes**
  - **Nominal sub-network bandwidth change**
  - **Other generic events identified by a TRIGTRAN working group**

Who receives notifications?

- **Hosts request event trigger coverage**
- **Hosts express interest in events**
- **TRIGTRAN routers notify interested hosts**

Notification model impacts scalability and ease of deployment

Protocol mechanisms for events

- **Open question to be explored.**
  - **An ICMP message**
  - **A unicast message to transport that requests triggers**
  - **A multicast message to listening transports**
- **Some questions to be answered:**
  - **The sending rate of trigger notifications assumed**
  - **Current Internet architecture issues (firewalls, NAT, ALG)**
  - **Current Internet deployment issues (ICMP black holes)**
  - **Security threat analysis**

What do transport entities do when they receive notifications?

- **Transports often ignore notification today**
  - **RFC 1122 - ICMP DESTINATION UNREACHABLE messages with codes of 0 (Net), 1 (Host), or 5 (Bad Source Route) are hints, not proof that a host is unreachable**
- **TRIGTRAN asks transports to consider notifications. Possible responses include:**
  - **Reducing TCP's congestion window**
  - **Sending a probe**
  - **Deferring packets until additional event notifications arrive**
  - **Notifying applications that an event has occurred**
- **Reasonable response varies by specific event**

Some Security Considerations

- **TRIGTRAN notifications can affect ongoing communications on the recipient hosts.**
  - **Malicious nodes can launch attacks on its victims.**
  - **Ex: an attacker can spoof a TRIGTRAN event to convince a victim that it can no longer use the network.**
- **DOS attack on TRIGTRAN router – by spoofing very high numbers of registration requests on behalf of non-existent hosts.**
  - **Attack would exhaust limited resources on the router**
- **Spurious notification by malicious host?**

TRIGTRAN protocol must include authentication for messages that can potentially create or alter state on protocol entities.

Threat model would reflect the types of events defined