

Structure Routing for Mobile Appliances (Make Wireless Internet Open)

H. T. Kung
Harvard University



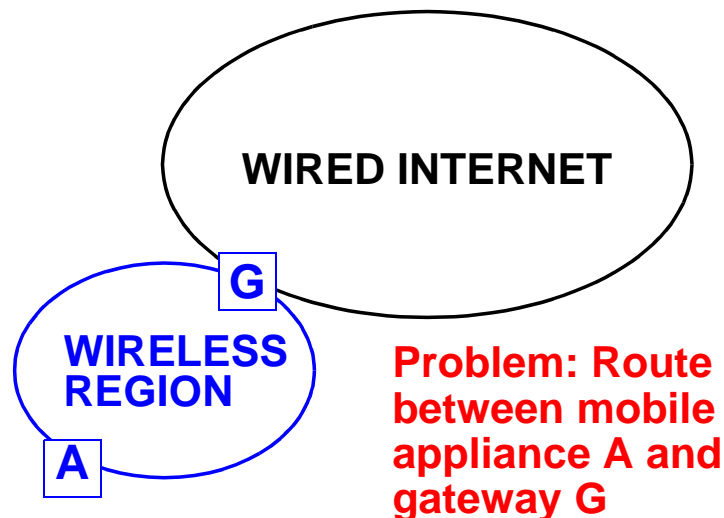
Sprint Research Symposium 2000

Overview of Presentation

- Objectives of this research
- Comparison with previous approaches
- Structure routing for mobile appliances (examples 1, 2 and 3)
- GPSR: Greedy Perimeter Stateless Routing (example 4)

2 of 15

Problem Addressed in This Presentation: Mobile Appliance Access



3 of 15

Basic Ideas of Some New Routing Protocols Will be Described

These protocols are based on the following two papers:

1. P. H. Hsiao, A. Hwang, H. T. Kung and D. Vlah, "Structure Routing for Mobile Appliances," February 2000
2. B. Karp and H. T. Kung, "GPSR: Greedy Perimeter Stateless Routing for Wireless Networks," February 2000

4 of 15

Design Objectives of the Routing Protocols

1. Simple

- No complicated routing protocol

2. Scalable

- Size of routing table independent of # destinations
- Support thin mobile appliances, e.g., server-based watches
- High-bandwidth transmission

3. Open

- Allow horizontal service providers

5 of 15

Proposed Structure Routing

Use structure information inherent in applications to assist routing

Examples:

1. Organization structure
2. Service structure
3. Resource structure
4. Geographic structure

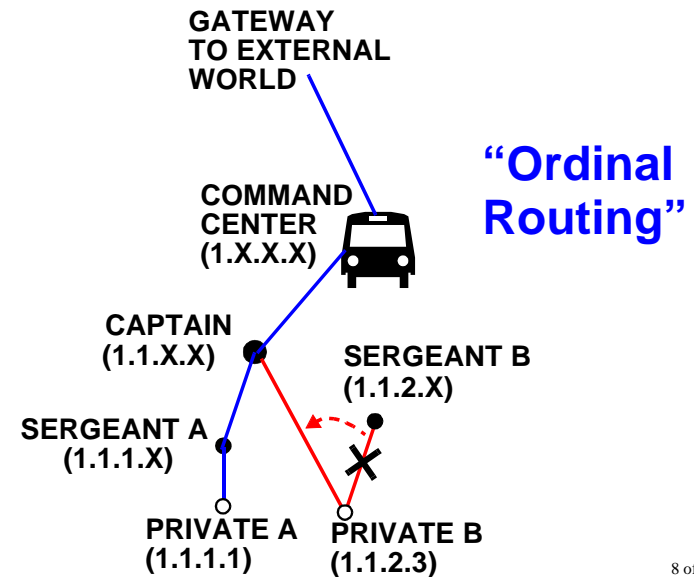
6 of 15

Comparison with Previous Approaches

- **Mobile IP:**
Forwarding over wired Internet
- **Ad-Hoc Routing:**
General routing protocols, making no use of structure info in application
- **CDPD, Metricom, etc.:**
Monolithic services; not open access; low-bandwidth transmission
- **Directory services:**
Too heavy for connectivity bootstrap

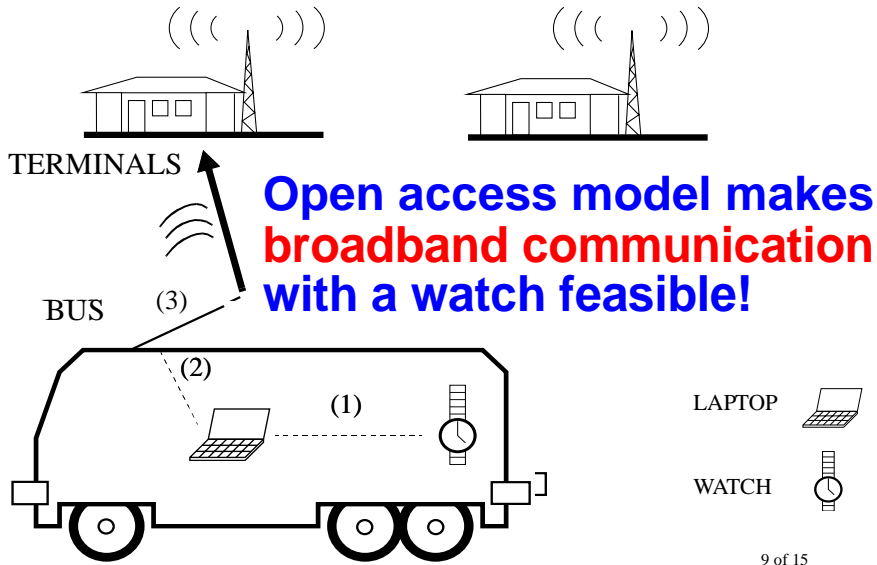
7 of 15

Example 1: Routing Based on Organization Structure

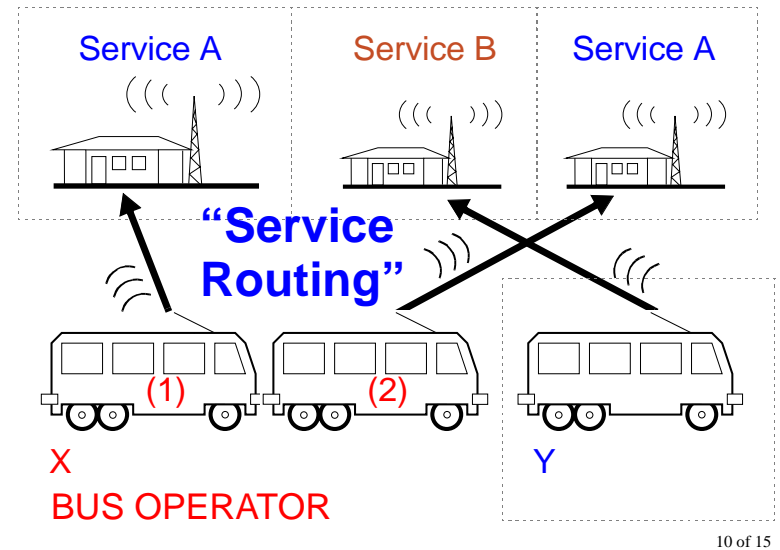


8 of 15

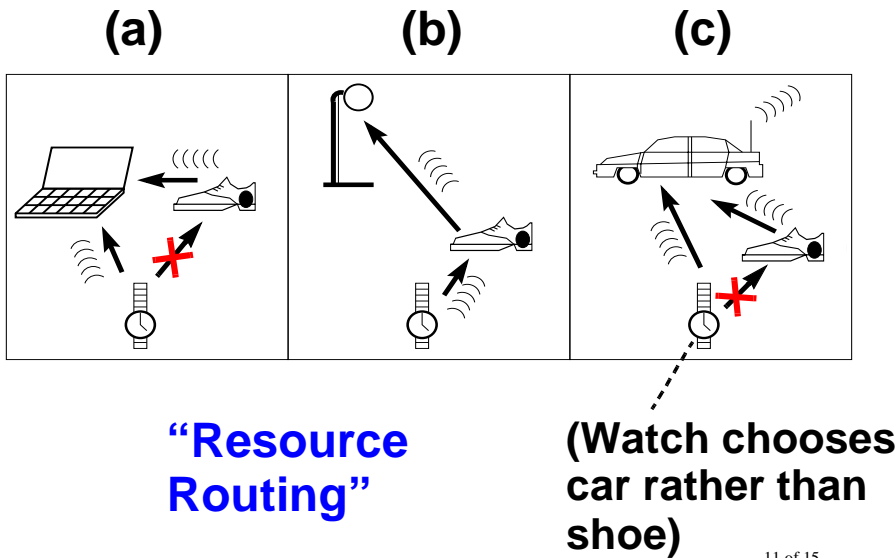
Example 2: Routing Based on Service Structure



Example 2: Routing Based on Service Structure / 2

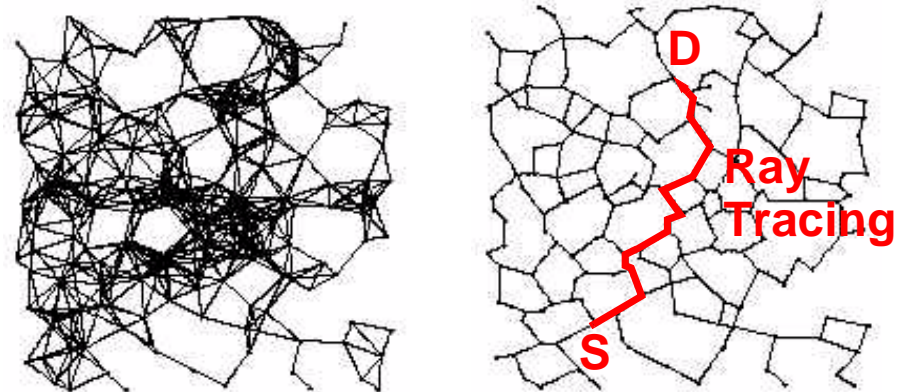


Example 3: Routing Based on Resource Structure

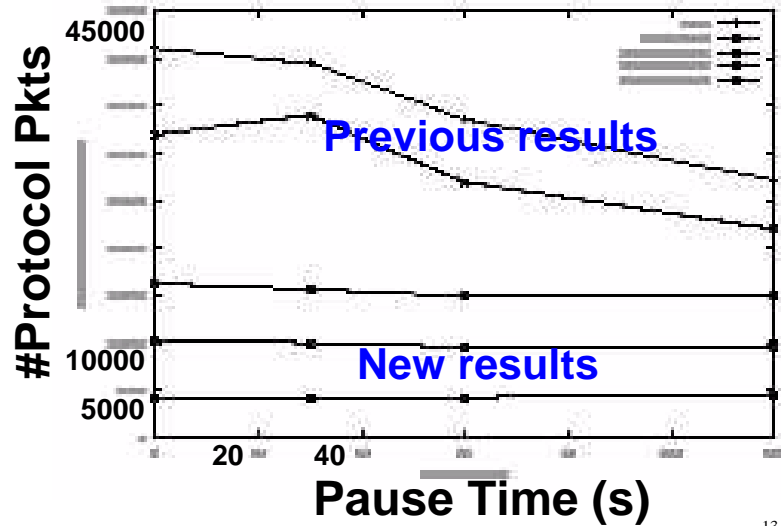


Example 4: Routing Based on Geographic Structure (GPSR: B. Karp)

Non-planar → Planar

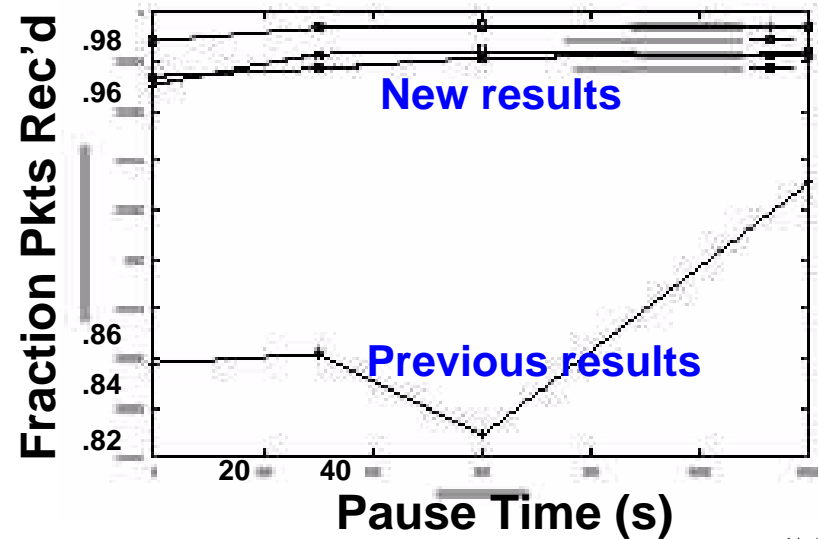


Example 4: GPSR /2 Routing Protocol Overhead



13 of 15

Example 4: GPRS /3 Packet Delivery Success



14 of 15

Conclusions

- Structure information may be related to organization, service, resource, geographic location, etc.
- Structure routing is simple, efficient (high delivery rate) and scalable, and facilitates open access
- Using structure routing (with Mobile IP), ultra-thin mobile appliances can be broadband servers reachable from anywhere

15 of 15