

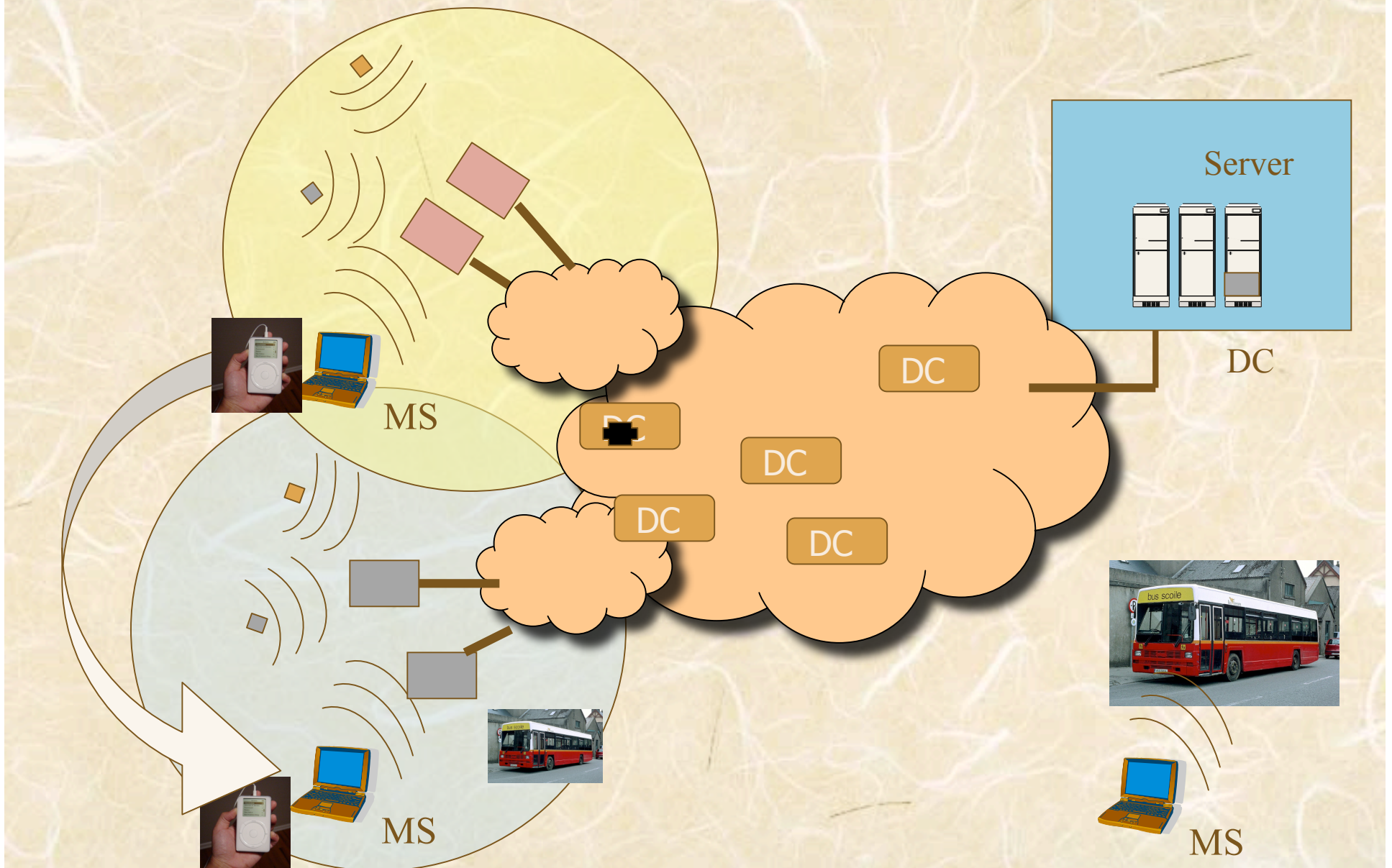
What's wrong with DTN and How to Fix It

S. Keshav
University of Waterloo

April 5, 2005

Joint work with Aaditeshwar Seth and Patrick Darragh

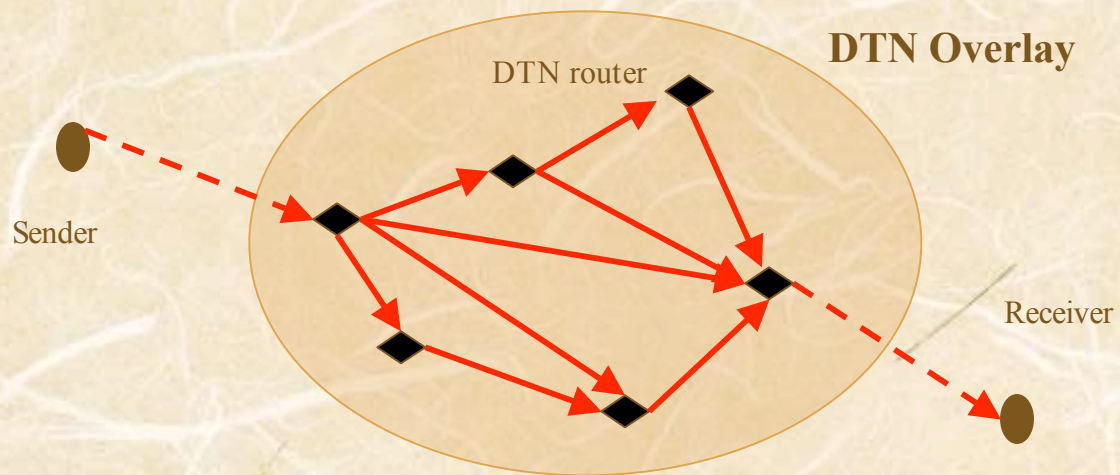
Tetherless computing world view...



Requirements

- **Must** build on existing Internet architecture
- **Disconnection resilience**
 - TCP cannot sustain long duration disconnections
 - Should not require both ends of a connection to be simultaneously present
- **Mobility transparency**
 - Address changes as a mobile host moves from one subnet to another
 - How to locate a mobile?
- **Access sensing**
 - Is a mobile in a hot spot in the first place?
 - And if it is, can it get to a DTN bundle daemon?
- **Identity management**
 - Mobile should have the same identity no matter where it goes
 - Mobile and infrastructure should mutually authenticate

DTN in a nutshell



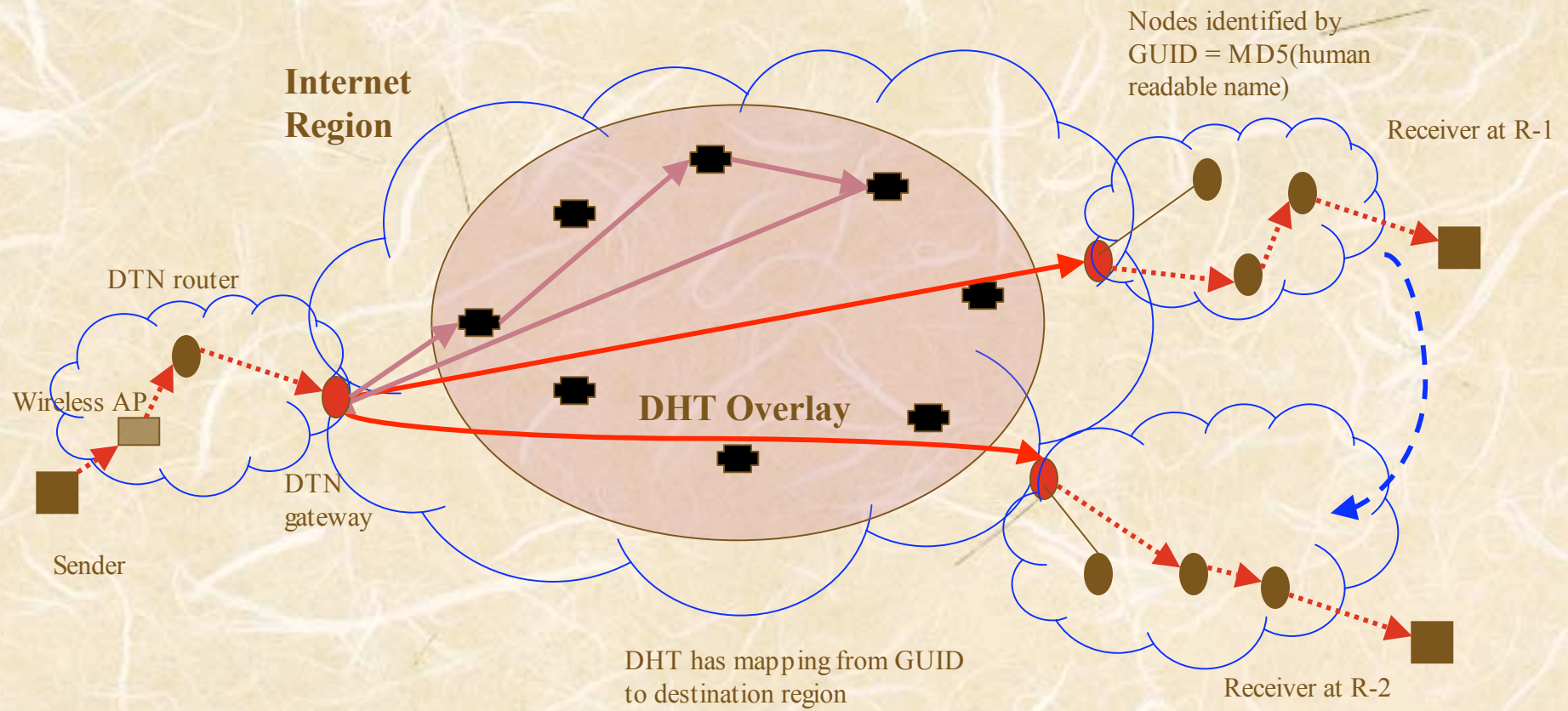
DTN is just like email but...

- Built-in support for disconnection
 - Reactive fragmentation
- Better routing (probably)
 - Dynamic, instead of MX records
 - Can be based on opportunistic or scheduled links
- General purpose API
 - Send() / Recv() like sockets
- Support for multiple classes of service
- Better identity management
 - We hope...
 - Avoid spam

What's wrong with DTN

- All regions are the same
 - But the Internet region is special!
- Mobility support
 - Cannot locate a moved receiver
 - Receiver must always use the original custodian
- No DNS equivalent
- No way to detect a link
 - How do we know there is link available?
- Also missing: security, identity management ...

Routing and mobility support



Innovations

- GUIDs
 - Separates address from location (like HIP or DOA semantic free identifiers)
 - This supports mobility
- GUID is MD5 hash of email address
 - Compatible with identity-based cryptography
- Unbound bundles
 - Lookup in the forwarding path
 - Allows disconnected endpoints that cannot do DNS
- DHT for HLR
 - Makes lookup scaleable and robust
 - Leverage current research in DHT (caching, efficient search etc.)
- Reverse Path Forwarding for local routing
 - Simple, stable, and self-configuring
- Backward compatible with DTN routing
 - No extra overhead on headers or routing tables
- Bundle relocation
 - Receiver always picks up data from closest custodian
 - Maximizes throughput of opportunistic connection

Link detection

- How does a device know a DTN link is available?
- Can do a broadcast at MAC/IP/UDP/App level
- Or go to a well known IP/Port
- Hack
 - go to .1 port 12345 of NATted address
 - can always port forward this elsewhere to proxy

Conclusions

- DTN is missing several key elements
- GUIDS + DHT + IBC + RPF + link probe solves some of these
- Many other open issues remain!