

## eXpressive Internet Architecture: Network Environments

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## Goals and Constraints

- Support research in how “XIA” can help address challenges in a real environment
- Gain experience in deploying and managing XIA networks
- Feed into the network architecture evaluation research and XIA evaluation
- Some practical constraints
  - Realistic to build the environment
  - Build on team expertise
  - Challenging and involves “inter” networking

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## Two Very Different Environments

- Vehicular networking
  - Very dynamic connectivity, links
  - Research collaborations with GM and Portugal
  - Inter-networking: many service providers, cars
- Large scale video distribution
  - Accounts for high percentage of Internet traffic
  - Very Quality of Experience expectations
  - Inter-networking: many diverse service providers

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## Vehicular Networking

- Uses DSRC in the 5.9 GHz band
  - Based on 802.11p, a variant of 802.11a
- Focus on Vehicle to Infrastructure (V2I)
  - Fewer dependencies on complex V2V challenges
  - Richer workloads, relevance to industry
- Very diverse challenges
  - Mobility, transport, security, services, ...
  - Privacy versus accountability tradeoffs

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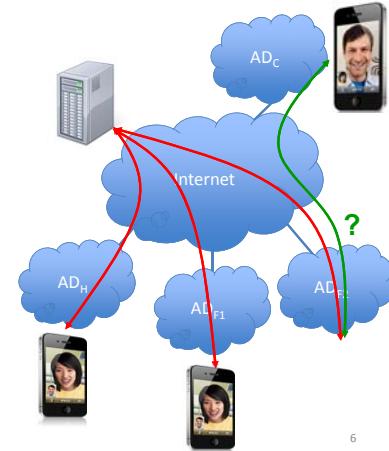
## Using XIA in Vehicular

- How can we use XIDs, DAGs, and intrinsic security?
- How can we make efficient use of the available connectivity
  - Security, transport, using caches and services, ...
- How do we manage an in-car network?
  - Mobile network, multi-homing, ...
- Public policy and privacy issues, e.g., tracking
  - Broader implication of self-certifying IDs

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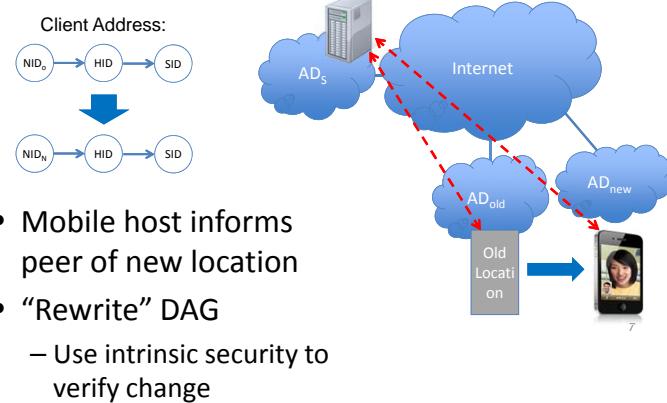
## Mobility is a Key Requirement

- Inter-domain mobility remains a challenge in today's Internet
  - Active sessions
  - New sessions
- Requires separation of identifier and locator – for XIA:
  - Identifier = HID
  - Locator = DAG



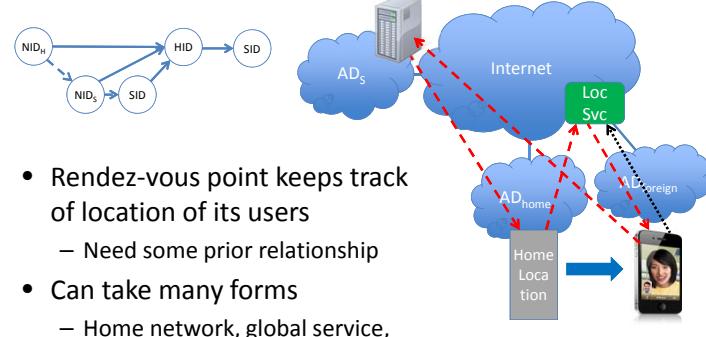
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## Maintaining an Active Session



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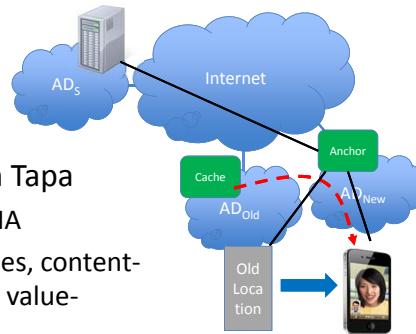
## Finding a Mobile Device



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## Optimizing Communication

- Previous work in Tapa
  - Overlaps with XIA
  - Transport services, content-centric support, value-added service, ...
- Privacy and accountability



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## XIA Native Deployment



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## Leveraging Pittsburgh Free WiFi



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## Related Updates

- We have run demos and experiments over GENI, Planetlab, and Amazon cloud
  - Size and scope of experiments is growing
  - Might be useful for teams to share experience
- Porting applications is critical and can be time consuming
  - We are working on some tools to help
- Access to data is important as well

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Questions?

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