

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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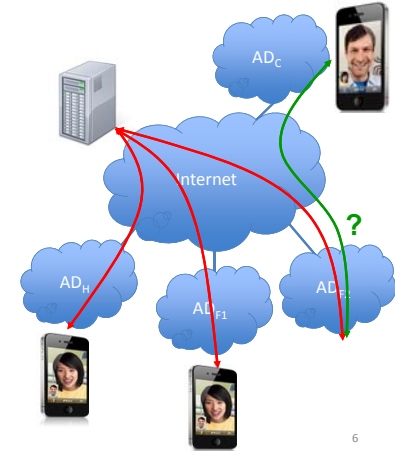
Using XIA in Vehicular

- 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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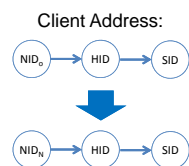
Mobility is a Key Requirement

- 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

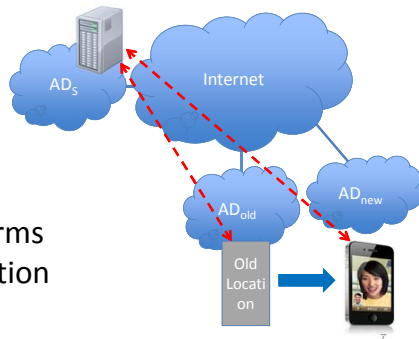


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Maintaining an Active Session

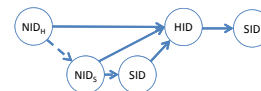


- Mobile host informs peer of new location
- “Rewrite” DAG
 - Use intrinsic security to verify change

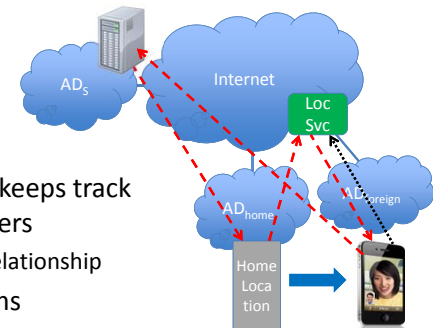


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Finding a Mobile Device



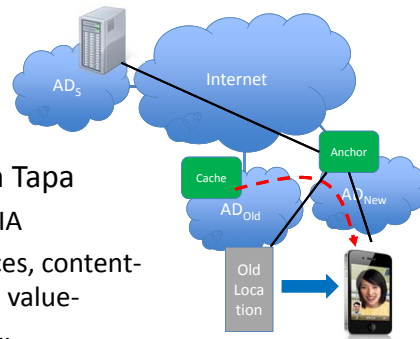
- Rendez-vous point keeps track of location of its users
 - Need some prior relationship
- Can take many forms
 - Home network, global service, hot spot providers, “DNS”, ...



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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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