Overview of U.S. ETC Standards and Implementations

The State of ETC in USA

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Outline

- Toll system landscape
- Evolution of ETC in the U.S.
- Current U.S. ETC – systems & standards
- Future of U.S. ETC – systems & standards

Ownership Structure – *Of Tolling Facilities*

- In USA, toll facilities are typically owned by:
  - Private companies (concessionaires)
  - Independent - Quasi Governmental Agencies
    - NJ Turnpike Authority
    - Massachusetts Turnpike Authority
    - NY Thruway
    - Port Authority of New York and New Jersey
- Decisions typically made by the agency !
  - (in a fairly uncoordinated way)

ETC in U.S. – *Some History*

- Amtech's 128-bit passive read-only ***Proprietary Tag***
  - Dallas and New Orleans – late 1980's (first U.S. systems)
  - Endorsed by American Trucking Association (ATA)
    - Called **"ATA" standard** – spread through central U.S.
- In 1991, seven toll facilities within the Northeast Corridor joined to form the **E-Zpass I**nter**A**gency **G**roup (**IAG**).
  - Selected Mark IV's active ***proprietary technology***
  - (IAG now includes more than 20 agencies)
- Mid 1990's, Florida Turnpike selected Amtech's Allegro [**Proprietary**] technology – the **SunPass** system
- Most back-office systems were (and still are) 'one-of-a-kind'

California – Develops an Open Standard

- Mid 1990's, CALTRANS (California Department of Transportation) "*takes action*"
  - Developed **Title 21 Tolling Standard**
  - Passive technology – not proprietary
  - Title 21 architecture was intended (*by California)* to be a "nationally interoperable 915 MHz standard" – but is voluntary outside California
  - ***Only open standard in the U.S. today***
  - Primary usage – California and Colorado
    - Widely deployed in CA – and still expanding
    - Colorado currently examining other technologies

ETC Success is Driven by Penetration

- Penetration (tag usage) depends on 2 things:
  - Benefits in terms of throughput at the tolling site
  - **Tag costs –** (because multipliers are very high)

- Today – tag penetration on a facility basis in the U.S. typically exceeds 50% - some above 80% at peak times
- Much lower tag costs have contributed greatly to this success – benefitting both agencies and patrons.

- (Note that ETC introduction was often opposed by the labor unions – lost jobs of toll takers)

ETC Has Also Been Driven By - The Evolution Of Technology

- Initial tags were read-only, utilizing both battery and beam-excited technology
- Then read-write tags were introduced – mostly battery technology
- Advances in technology have allowed
  - Multi-protocol readers
  - Multi-protocol tags compatible with older facilities
  - Higher capabilities with non-battery tags
  - Lower cost tags
  - Open road architectures
- Keeping “funds” on the card has been replaced by faster networks and real-time transaction processing

Therefore - Since 2000 – Some New Things

- Over the last decade, increased user needs and technology advances have moved things forward
  - Desire for deeper penetration + better tag technology = *low cost, high capability, battery-free sticker tags*
  - Desire for improved lane throughput + better lane technology = *barrier-free, open-road tolling systems*
  - Desire for tags to 'work everywhere' + supplier innovation = *affordable, multi-protocol systems (tags and readers)* to provide the desired portability without forcing entire deployed systems to be replaced

Toll System Architecture

- Varied – **no national standard**
- Clearinghouse is typically agency-owned (& often unique)
- Multi-agency common toll collection – not happening in a national sense, but does exist in places:
  - Multi-state, multi-agency within the IAG
  - Within some individual states (e.g., Texas, Florida, California)
- Back-office fee collection – typically based on credit cards and debit cards - using banking transaction standards
- Violation Enforcement – often uses custom systems
  - Including custom interfaces to individual state databases (for registration information)

Future Directions

- **If** there is ever a ***U.S. national standard*** – it's likely to be one of the following:
  - **5.9 GHz DSRC** using IEEE 1609.x and 802.11p – (open standards)
  - **VMT (Vehicle Miles Travelled)** system using TBD standards
  - Or some combination of the two
- Solution would be driven by:
  - Fiscal needs of building & maintaining roadways
  - Deployment of the US DOT's ***IntelliDrive*** initiative
    - Many applications – includes capability for tolling

Summary

- ETC in the U.S. was (and still is) **market driven**
- There is **no national ETC standard**
- **Most** deployed systems use proprietary protocols
- Recent focus has been on:
  - **Inexpensive tags** (Cheap tags = greater usage)
  - **Interoperability** (Allowing tags to cross borders)
- As technology improves – tags get cheaper and capabilities get higher
- Penetration of ETC "tags" continues to grow

- Future development of **national** standards is uncertain at this time

Thank you

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