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ALLIANCE**

# **Core Working Group Summit**

**October 21, 2015**

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# Agenda

## 1. Core WG Technical Meeting

- Group discussion
- Architecture discussion

## 2. Core WG Summit

- What we have done so far
- Status on open source test assets
- Tech overview of Security 2.0
- 16.04 feature set



# **Core WG Technical Meeting**

# Core WG Technical Meeting

- Group discussion
  - Identify top technical issues with AJCore
  - Identify leads/teams for each of them to begin efforts to resolve
  - Leads for each of the architecture topics will present 5-10 minutes summarizing issue and next steps

# Core WG Technical Meeting

- Architecture topics
  - MSFT
    - Scalability and performance: any ideas related to Erdinc's recent measurements? (TBD next week)
      - Any other known issues?
    - Enabled AJ mDNS to interoperate with off the shelf mDNS implementations (Dave Thaler)
      - How would this work? What are the implications for the current implementation?
    - Mutex class (Dan Mihai)
      - Detecting potential deadlocks
      - Should recursive lock acquires be banned?
    - Anyone interested in enabling AllJoyn across the LAN / multiple network links? (Dan Mihai)
      - What are some of the technical challenges?
  - QCE
    - Concurrent callbacks - design, limitations, common deadlocks, etc. (Todd Malsbary)
      - Previously I discussed these with Todd and other QCE folks.
    - Optimize PubSub signals (Todd Malsbary)
      - Broadcast/sessioncast/addmatch: How those interact for optimal delivery?



# **Core WG Summit**



# Agenda

1. What we have done so far
2. Status on open source test assets
3. Tech overview of Security 2.0
4. 16.04 feature set





# What we have done so far

Marcello Lioy

# What have we done so far?

- 14.02
  - First official Alliance release
- 14.06
  - Next Generation Name Service (NGNS)
  - Security Enhancements: support for ECC based authentication
  - Policy DB: rules to manage the flow of messages through the router to and from applications
  - Sessionless Signal (SLS) optimizations
  - Events and Actions
  - UDP Transport (experimental)

# What have we done so far?

- 14.12
  - Major Stabilization fixes for the system when it is under load
  - Hardening and performance improvements of the UDP RN to RN transport
  - Integration of the About feature into the core framework
  - Support for the Self-Join session feature
  - Auto-pinger feature
  - Migration of PropertyChanged signal from BusListener to ProxyBusObject
  - Heartbeat from the Router to TC application
  - UDP Transport: router to router transport using reliability protocol on top of UDP
  - Blacklisting feature for TC RN discovery
  - Configuration of the heartbeat from the routing node to the TC
  - Support for discovering RN using mDNS/NGNS
  - Logging messages print out wall clock time on Linux
  - EXPERIMENTAL: Add an implementation for About Client with Announce processing and handler registration

# What have we done so far?

- 15.04
  - Property cache feature
  - Support for X.509 ECDSA digital certificates, which replace the X.509 RSA certificates
  - Remove excessive name transfer for all sessions.
  - Observer Functionality
  - It is now possible to build for Android without requiring OpenSSL
  - Add to About C API: a second `announce_using_datalistener` method was added
  - Add support for detecting idle RNs allowing the RN to shut down automatically if no LNs have used its services for a while
  - Support for iOS 8.1
  - Allow the setting of the `UNMARSHAL_TIMEOUT`
  - AJTCL Router Selection
  - Support for X.509 ECDSA digital certificates, which replace the X.509 RSA certificates
  - AJTCL adds information string to reply messages
  - Add support for specifying NVRAM file location on Windows
  - EXPERIMENTAL: UDP Transport for TC <-> RN connections. Thin Client to Routing Node version of a UDP-based transport

# What have we done so far?

- 15.09
  - Security 2.0 was added as a Developer Preview Feature
  - ARDP/UDP transport between TC and RN is product ready
  - Change Win7 LN SC Application to connect to the Win10 named pipe, when running on Win10
  - Add About feature to JavaScript binding
  - SC/TC: Expand conversation hash to include all parts of auth conversation
  - Reorganize TC code base
  - Add APIs to support asynchronous method replies

# What have we done so far?

- Total tickets addressed
  - Tasks: 376
  - Bugs: 1,693
- Collaboration
  - Stats
    - Chart of commits across contributing companies
    - Estimated number of committers
  - Talk to project teams
    - Security 2.0
    - AllJoyn.js
    - DDAPI

# What have we learned?

- What have we learned
  - Process
    - Pain points
      - Testing efforts
      - ...
    - Improvements
      - Alliance engaged 3<sup>rd</sup> party vendor for testing
      - Triage
      - Ticket classification
  - Collaboration
    - Lessons
    - Engagement (ask vs mail list vs JIRA)
      - Parallel processes due to code mirroring on other sites



# Status on open source test assets

David McBride



# Placeholder for test status slides

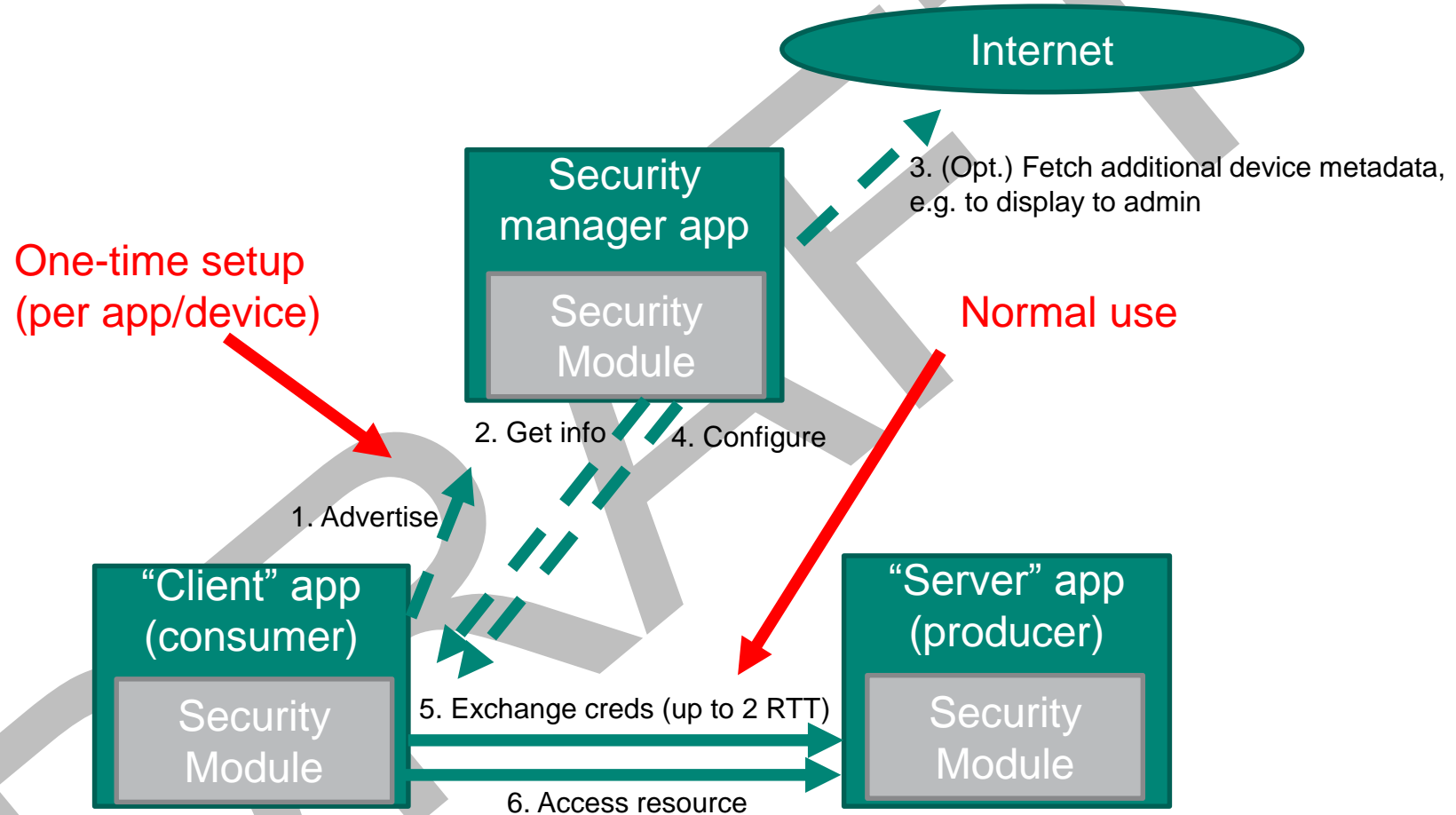
DRAFT



# AllJoyn Security 2.0 Model

Dave Thaler  
Software Engineer, Microsoft

# Overview



# Security principals (1/2)

- Identity (“identity cert”) identifies a single app or device
  - An identity is actually a certificate chain
    - Each cert is signed by another cert, up to some root
  - Every application/device has its own identity
  - Root is the identity/group that runs/owns it
  - Delegation is permitted if one’s identity cert allows it
    - Delegation means you’re allowed to sign other certs
    - Typically means an assertion of ownership

# Security principals (2/2)

- Security group identifies a set of apps/devices
  - Membership in a security group is also a certificate chain with a unique membership cert as a leaf
  - Every application/device has membership certs for 0 or more security groups of which it is a member
  - Can get a membership cert chain from a different root from your identity
    - E.g., your app/device can also be a member of someone else's group
  - Delegation is permitted if one's membership cert allows it
    - Delegation means you're allowed to admit others into the group

# Certificate Revocation

- What if some device is sold, stolen, or compromised without being factory reset?
  - Certificates inherently have some lifetime
- Early revocation permitted via “Certificate Revocation List” checking
  - No dependency on runtime availability of some service
  - Not implemented in 15.09 release
  - Can also be mitigated by just updating policies on peers to disallow access by revoked certificate

# Examples

- Users:
  - Dad (self-signed)
  - Mom (self-signed)
  - Son (signed by Mom)
- Devices:
  - TV: admin = Dad
  - DCR: admin = HomeAdmin
  - Son's tablet: admin = Son
- Mom's Security groups:
  - HomeAdmins: { Dad, Mom }
  - LivingRoomDevices: { TV, DVR }
- TV's admin is dad but it's still in Mom's security group

# Authentication

- An app has a set of trusted roots
- A peer's cert chain is “trusted” to be what it claims to be if a trusted root appears anywhere in that certificate chain
  - This doesn't mean it's allowed to do anything yet though... that's “authorization” which we'll come to next
- Identity cert chains exchanged at start of connection (usually mutual auth)
- Then exchange membership certs that chain up to a cert in peer's identity cert chain
  - Thus, you only disclose memberships relevant to that peer
- Another option is the “real estate agent” scenario where your membership cert can be pre-provisioned in peer app/device and yours



# Authorization

- AllJoyn has both an “ACL” model and a “capabilities” model
  - Both checks must succeed for a remote call to succeed
- Access Control Lists (ACLs) are on your resources and control what peers are allowed to do
  - Analogous to a guest list at a private gathering
- Capabilities are what you are allowed to do (enforced by peer)
  - Analogous to a drivers license that says what you can drive
  - Capabilities help protect against compromised apps/devices

# ACLs

- ACL (“policy”) are private between the app/device and its admin(s)
- Resources can be ACL’ed to a set of any of:
  - All (anonymous)
  - Any authenticated
  - Any authenticated that chains up to a given certificate authority
  - A specific security group
  - A specific identity (public key)
- ACL entries have separate flags for read vs write
- Optionally can also ACL who you will send outgoing calls to

# Capabilities, similar to “app manifest”

- Each application has a list of what interfaces (not object instances), it can possibly access and expose
  - AllJoyn interfaces use a hierarchical resource naming scheme that includes DNS names for uniqueness, similar to an XML namespace
- Authorized set of capabilities get signed by same entity as your identity cert (referred to as a “security manager”)
- During one-time setup, security manager gets this, and authorizes it for all or some (possibly empty) subset of these as part of giving it identity & membership certs
- Capabilities presented along with one’s certs when making a connection
  - Just like presenting a drivers license both asserts identity and permission to drive

# Bootstrapping (one-time-setup)

- New app/device advertises itself as unclaimed
  - In future, could even be passive advertisement (e.g., QR code)
  - Most common new device example is where device is a temporary WiFi SoftAP with a special SSID convention (or potentially IE's, etc. in future)
- Security Manager app sees it, and queries its potential capabilities
  - Usually uses some sort of PIN/passphrase scheme at this point, but could be anything
- (Opt.) Get trusted textual descriptions etc. to assist human in acknowledging granting of capabilities [not implemented in 15.09]
- Security Manager configures app/device:
  - “Onboarding” = configuring L2 network credentials (e.g., WiFi keys) if needed
  - “Claiming” = configuring
    - 1 or more trusted root<sup>1</sup> certs
    - Identity cert chain
    - 0 or more membership cert chains
    - Signed capabilities
    - ACLs

<sup>1</sup>Manufacturer functionality such as app/firmware update might also use a manufacturer cert to verify code, but usually considered separate root from rest of functionality



# 16.04 feature set

Marcello Lioy

# 16.04 features

- 23 JIRA tickets in 5 categories
- Categories (with examples)
  - App Developer Usability
    - Fix the Logger so it can work with ETW on Windows
    - Support Android Studio
  - Core Developer Usability
    - Add functions for runtime creation of Aj\_Objects
  - Security enhancement
    - Design and implement new password-based authentication mechanism
    - ECDSA Certificate generation APIs should be implemented for language bindings.
  - Optimization
    - Teach BusAttachment to keep track of registered AddMatch rules
  - System Evolution
    - Add support for extended introspection XML format

# 16.04 list of features as of 9/10/15

| Key                          | Summary  | Bucket                       |
|------------------------------|--|------------------------------|
| <a href="#">ASACORE-2034</a> | Deadlock if max BusAttachment concurrency is reached   | App Developer Usability      |
| <a href="#">ASACORE-1993</a> | Drop connection to router node if bus operations timeout   | App Developer Usability      |
| <a href="#">ASACORE-1759</a> | Add support for a new callback that will inform a multi-point session joiner that the session host has accepted its join request | App Developer Usability      |
| <a href="#">ASACORE-1556</a> | Fix the Logger so it can work with ETW on Windows  | App Developer Usability      |
| <a href="#">ASACORE-2273</a> | Alljoyn Thin Core API to get socket descriptor...  | App Developer Usability      |
| <a href="#">ASACORE-1930</a> | Distributables should have QCC_OS_GROUP_ defined   | App Developer Usability      |
| <a href="#">ASACORE-1811</a> | Returning an error name/message on calling SetProperty   | App Developer Usability      |
| <a href="#">ASACORE-1374</a> | Support Android Studio   | App Developer Usability      |
| <a href="#">ASACORE-1112</a> | BusObject does not contain a GetInterfaces API call  | App Developer Usability      |
| <a href="#">ASACORE-1166</a> | API Call to reset changeld for About Annoucements  | App Developer Usability      |
| <a href="#">ASACORE-942</a>  | About feature should provide an implementation of generating a device ID for each platform                                       | App Developer Usability      |
| <a href="#">ASACORE-1065</a> | Add functions for runtime creation of Aj_Objects   | App/Core Developer Usability |
| <a href="#">ASACORE-2404</a> | Add Mutex::AssertIsOwner() functionality   | Core Developer Usability     |
| <a href="#">ASACORE-2386</a> | Add a platform independent QCC_ASSERT macro  | Core Developer Usability     |
| <a href="#">ASACORE-2005</a> | Teach BusAttachment to keep track of registered AddMatch rules   | Optimization                 |
| <a href="#">ASACORE-2364</a> | General support for key types other than ECC NIST P-256  | Security enhancement         |
| <a href="#">ASACORE-2363</a> | Store more data about trust anchors  | Security enhancement         |
| <a href="#">ASACORE-2055</a> | Design and implement new password-based authentication mechanism   | Security enhancement         |
| <a href="#">ASACORE-1715</a> | Private key protection support for using passphrase not applicable for ECDHE_ECDSA mechanism.                                    | Security enhancement         |
| <a href="#">ASACORE-1714</a> | ECDSA Certificate generation APIs should be implemented for language bindings.   | Security enhancement         |
| <a href="#">ASACORE-1430</a> | Packet header encryption   | Security enhancement         |
| <a href="#">ASACORE-2254</a> | Add support for a "const" annotation for properties  | System Evolution             |
| <a href="#">ASACORE-964</a>  | Add support for extended introspection XML format  | System Evolution             |

# Thank You

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