Distributed Ledgers

RESO Fall 2019
Agenda

Coming up to speed on workgroup issues
Discussion on charter of the workgroup and recap events since the RESO Spring Conference
RCPs posted on the collaboration system will be reviewed and voted upon for inclusion

Demonstrations of the Event Model
During RESO Spring Conference, ReConsortia and ShelterZoom discussed their use cases. We will have an update on their progress and two new reference implementations will be demonstrated:
- Brokerage - Use of the Event Model in the **Agent On-Boarding Process**
- MLS - Use of the Event Model in a **Real Time Push Application** for subscribers

Distributed Ledgers and Decentralized Identities
A potential next area for the workgroup to address is the use of decentralized identifiers for referencing event subjects
Coming up to speed on workgroup issues

Release of Draft 1.3
What is in the current draft?

- RESO Distributed Ledger Event Model representing a standard approach that can be used to reliably record, playback, and communicate events
- Examples of the event model and simples to demonstrate the model
- Sections describing components of the model and lookup types
Demonstrations of the Event Model

Draft 1.3 Reference Implementations
Multiple Listing Service

Real time Push Application for subscribers using the RESO Event Catalog
Events

- Coming Soon
- Price Change
- Active
- Closed
- Message
- Expiring
Channels

17 OAK AVE - COMING SOON
message 1559874279594 sent at 02:24

30 HIGHGATE CIR - $65,900
message 1559874279536 sent at 02:24

4046 HEATHERSTONE CT - COMING SOON
message 1559874279479 sent at 02:24

2926 LAWRENCE DR - $89,900
message 1559874279416 sent at 02:24

12 AMHERST WAY - COMING SOON
message 1559874279337 sent at 02:24

40 U ST NW - $124,500
message 1559874279281 sent at 02:24

234 HARRIS ST - ACTIVE
message 1559874279226 sent at 02:24

9 GOLDEN CIRCLE LN - ACTIVE
message 1559874279177 sent at 02:24

10912 BROAD GREEN TER, ROCKVILLE - CLOSED
message 1556166530567 sent at 19:55

19601 GASSAWAY LN, GERMANTOWN - CLOSED
message 1556166494493 sent at 19:49

110 PRADO LN #2206, CLARKSBURG - COMING SOON
message 15561664824703 sent at 19:47

3121 BEAVERWOOD LN, SILVER SPRING - ACTIVE
message 1556166458566 sent at 19:43

14709 ELISSA DR, ROCKVILLE - ACTIVE
message 15561664585264 sent at 19:43

1013 LOXFORD TER, SILVER SPRING - $459,900
message 15561664226180 sent at 19:37

6005 JOHNSON AVE, BETHESDA - CLOSED
message 1556166398481 sent at 19:33

124 HEMLOCK ROAD, FLINTON - Expires 2019-06-28 - ACTIVE
message 15561680619697 sent at 02:10

663 AUDUBON RD, HEDGESVILLE - Expires 2019-06-28 - PENDING
message 15561680619690 sent at 02:10

19 RACHEL LN, BERKELEY SPRINGS - Expires 2019-06-28 - ACTIVE
message 15561680619684 sent at 00:10

1034 TOMS KNOB APPROACH, LOST RIVER - Expires 2019-06-28 - ACTIVE
message 15561680619673 sent at 00:10

1 APPLE TREE LN, MOOREFIELD - Expires 2019-06-28 - ACTIVE
message 15561680619666 sent at 00:10

SHENANDOAH MOUNTAIN, MATHIAS - Expires 2019-06-28 - ACTIVE
message 15561680519661 sent at 00:10

SHENANDOAH MOUNTAIN, MATHIAS - Expires 2019-06-28 - ACTIVE
message 15561680519650 sent at 00:10
Real-Time Push

HTTPS Server

Server Side Events (SSE)

Also Tried
- Web Sockets
- Long Polling

Web

Mobile
- iOS
- Android
Real-Time Tap
AWS Service
UI Upgrade

Old

New
Agent Onboarding

Benefits of tracking events for a brokerage using RESO Event Catalog
Immediate Benefits - Operational Efficiency

- Onboarding specialists can see where applicants are in the process and proactively assist.
- Based on ledger events coming across during the application completion and submittal process, applicants can be identified as ‘stuck’ in a certain area of the join app.
- Internal staff ability to identify and reach out to Agents who are having trouble before they realize they are having trouble will reduce abandoned applications and help the onboarding specialist work more efficiently.
Prolonged Benefits - Informed Strategic Decisions

- As a brokerage, the onboarding process can be holistically viewed and analyzed for bottlenecks or other inefficiencies.
- The analysis of onboarding events would provide the timeline to get from one major milestone to the next and help determine the need of certain milestones (or the arrangement of them).
- Ultimately, the data recorded would allow for brokerage leaders to make meaningful decisions about onboarding process improvement.
Proposed Events

- New Application
- Personal Information Records
- Primary License Information
- Additional License Information
- Experience Records
- Financial Records
- Verification Stage
- Approval Stage

- Reviewing Stage
- Record Transfer
- Email Verification
- Independent Contract Agreement
- Organization/Agent Change
Events with States

- Application Started
- License Provided
- Experience Provided
- Financial Provided
- ICA Signed
- Verification Complete
- Verification Failed
- License Verified
- License Approved
- License Denied
- Approval Complete
- License Transferred
- Email Verified
- Organization Joined
### Personal Validation
- Approved: Yes

### License
- Transferred: Yes

### Application
- Transferred: Yes

### License Validation
- Transferred: Yes

### ICA
- Confirmed 37 days ago
- Signed: Yes

### Primary License
- Transferred: Yes

### Application
- Transferred: Yes

### License
- Transferred: Yes

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**LICENSE1 TRANSFERRED**
- Mon, 09 Sep 2019 20:49:48 GMT
- AGENT MICAH

**ICA COMPLETE**
- Mon, 09 Sep 2019 20:49:39 GMT
- AGENT MICAH

**ICA SIGNED**
- Mon, 09 Sep 2019 20:49:21 GMT
- AGENT BROKER

**ICA SIGNED**
- Mon, 09 Sep 2019 20:48:13 GMT
- AGENT BROKER

**ICA SIGNED**
- Mon, 09 Sep 2019 20:46:57 GMT
- AGENT BROKER

**LICENSE1 APPROVED**
- Mon, 09 Sep 2019 20:46:28 GMT
- AGENT MICAH

**LICENSE1 APPROVED**
- Mon, 09 Sep 2019 20:45:17 GMT
- AGENT MICAH

**LICENSE1 APPROVED**
- Mon, 09 Sep 2019 20:44:14 GMT
- AGENT MICAH

**LICENSE1 VERIFIED**
- Mon, 09 Sep 2019 20:44:02 GMT
- AGENT MICAH

**LICENSE1 VERIFIED**
- Mon, 09 Sep 2019 20:42:38 GMT
- AGENT MICAH

**APPLICATION COMPLETE**
- Mon, 09 Sep 2019 20:38:11 GMT
- AGENT AGENT
Referrals Tracking

Tracking referrals using RESO Event Catalog
Referral Lifecycle Events

Support different professionals that interact with the referrals such as: getting help from transaction coordinators

Support common scenario such as: split referrals. Professional needs to split a referral and change the compensation structure accordingly

Maintain its integrity, but at the same time be flexible enough to support real use cases. Referral may change since the moment is created, until its close
Proposal for tracking Events in a Referral System

- System Name - **Referral Marketplace Service**
- Subject Type - **Sub Referral**
- Entity - **Transaction Coordinator**
- Events - **Sub Referral, Compensation, Source, Destination**
- States - **Added, Splitted ...**
Next Steps

Where do we go from here?
A potential next area for the workgroup to address is identity management using **Decentralize Identifiers**. The Event Model is already designed to support decentralized identifiers so this direction is logical.

**Distributed Ledgers and Decentralized Identities**
Decentralized Identifiers are globally unique, highly available and cryptographically verifiable.

Example:

did:v1:nym:BcNkgGmGEPcGSJSMPB4BvWvwVM6YeTR52BSWcZTbzU23
Decentralized Identifiers (DIDs)

- DIDs resolve to DID Documents describing how to use that specific DID
- Each DID Document may express cryptographic material, verification methods, and/or service endpoints
- The DID Document contains attributes or claims about the DID Subject

```json
{
    "@context": "https://example.org/example-method/v1",
    "id": "did:example:123456789abcdefghi",
    "service": [{
        "serviceEndpoint": "https://example.org/
    }]
}
```
DID Document - Example

{
    "id": "did:reso:upid:xxx-yyyy-yyyy-yyyy-xx",
    "service": [{ //could be used to retrieve associated property history
        "id": "did:reso:upid:xxx-yyyy-yyyy-yyyy-xx#history",
        "type": "PropertyHistoryService",
        "serviceEndpoint": "https://mls.com/get"
    },{ //or to retrieve associated parcel data and more...
        "id": "did:reso:upid:xxx-yyyy-yyyy-yyyy-xx#parcel",
        "type": "ParcelDataService",
        "serviceEndpoint": "https://county.gov/parcel"
    }]
}

Event Referencing a DID

```json
{
    "TransactionId": "4b46aadd-0f2a-4e79-b3a6-e2e45927d2a2",
    "System": "Transaction Management",
    "SubjectType": "Property",
    "Entity": "Broker",
    "Event": "Contract",
    "State": "Signed",
    "Recorder": "did:reso:ouid:abcdefgh12345678#0001",
    "Timestamp": "Sun, 03 Jun 2018 13:04:05 GMT",
    "Application": "87478-a43"
}
```
Questions?

Distributed Ledgers

Thank You!
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THANKS