

# Improving Damage Assessment and Event Restoration with the Operations Mobile Application (OMA) Solution

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# GridBright and Eversource Team



## Ken Brajczewski

*Senior Director, ADMS & Business Integration - GridBright*

Ken has over 33 years of experience working in the utility industry. He is a proven subject matter expert in implementing Network Management Systems, Mobile solutions, and Emergency Preparedness capabilities in major utilities.



## Bill Mullenmaster

*Executive Vice President & Chief Architect - GridBright*

Bill has worked over the last 20 years with utility customers to build solutions, systems, and integrations to improve a more reliable and sustainable integrated grid. He is a proven technical systems and integration architect for multiple clients in the utility industry.



## Chris Piccolo

*Manager, Grid Modernization Technology - Eversource*

Chris has been in the Electric Industry for 25 years and has been with Eversource for the last 15 years. Chris has spent time in Engineering, Field Operation, System Operations & most recently Grid Modernization where he is currently the Business Manager responsible for all Outage Management related applications including Network Management Systems (NMS), Operations Mobile Application (OMA), and Oracle Utilities Analytics (OUA).



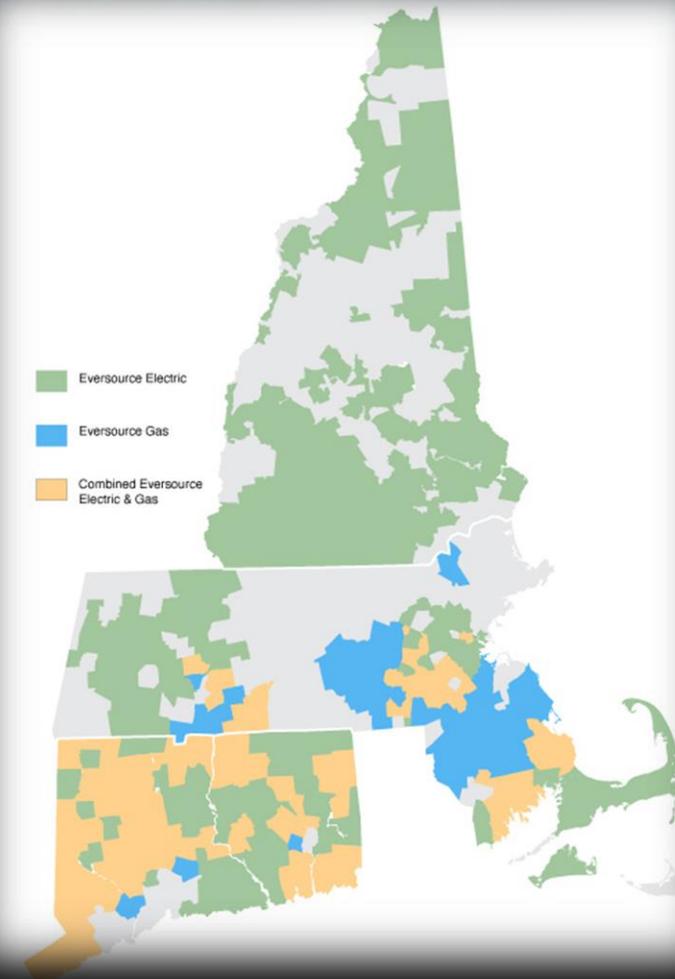
## John "Jack" Lacroix

*IT Business Applications Developer - Eversource*

Jack LaCroix joined Eversource Energy in November 2021. He works as an IT Business Applications Developer in the Real Time Systems dept supporting Network Management Systems (NMS), Operations Mobile Application (OMA), and other custom integrations and interfaces.

# About Eversource Energy

- Over 9,000 employees
- 4 Operating Companies (Electric) covering Connecticut, Massachusetts and New Hampshire
- Serving 3.1 Million Electric Customers
- Covering 13,000 square miles of territory
- 40,542 circuit miles of electric overhead distribution lines
- 900,000 Gas Customers served in CT and Massachusetts
- Water served in Massachusetts (Newly acquired Aquarion)



# OMS History at Eversource

- **Late 1990s** Deployed commercial Outage Management System (OMS) at Northeast Utilities (NU)
  - Basic OMS functionality in Connecticut and Western Massachusetts
- **2015** NU merged with NSTAR and became Eversource
  - Added NH territory
  - Rolled out commercial OMS from Oracle to NSTAR
  - NSTAR territory covered all Eastern Massachusetts
- **2017-2018** Integration with Mobile Data Management System
- **2018** Integrated with SCADA for New Hampshire
- **2019-2022** Upgraded to Oracle Network management System (NMS) 2.4
  - Added: Operations Mobile Application (OMA) , Switching (Planned Outages), Single No-Lights (SNL) Module, Equipment Failure Reporting (EFRS), upgraded Online Trouble Ticket Reporting System (OTTRS), Oracle Utility Analytics (OUA), and major infrastructure changes
- **2023** OMA Extension pilot for Restoration work

# OMS System Landscape (Ecosystem)

The Eversource Ecosystem is comprised of the following systems:

- OMS (Outage Management System)
- OMA (Operations Mobile Application)
- OUA (Oracle Utility Analytics)
- OTTRS (Online Trouble Ticket Reporting System)
- Mobile Data System Schedule and Mobile modules (Click Schedule and Click Mobile)
- ARCOS (Automated Roster Call Out System)
- RTS Portal (Real Time Systems)
- Outage Map Integration (Internal and External)
- Municipal Portal (Muni-Hub)
- Reliability Indices Reporting
- Web Integration Middleware
- Azure Integration

# Improving Damage Assessment and Event Restoration with the Operations Mobile Application (OMA) Solution

Eversource, as part of a company wide effort, has targeted outage restoration as an area for focused improvement. Adding this mobile solution for assessment details and NMS model operations during major events is one improvement Eversource implemented in 2022 for internal and external mobile damage assessors. Eversource also saw an opportunity to evaluate OMA not only for damage assessment, but also as a potential tool for the restoration process and is currently piloting for day-to-day emergent work.

# OMA for Damage Assessment

# Operation Mobile Application (OMA) for Damage Assessment

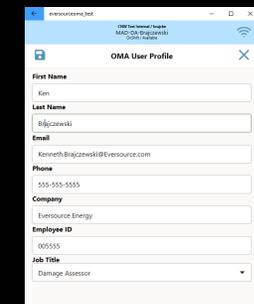
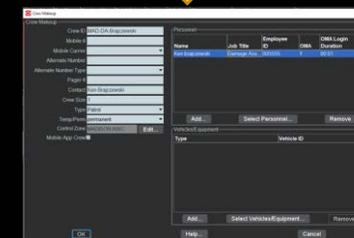
OMA for damage assessment integrated with ARCOS and Oracle NMS during the Eversource NMS upgrade in 2022.

# Operation Mobile Application (OMA) for Damage Assessment

Key deliverables for this upgrade included the following:

## User and Crew Management

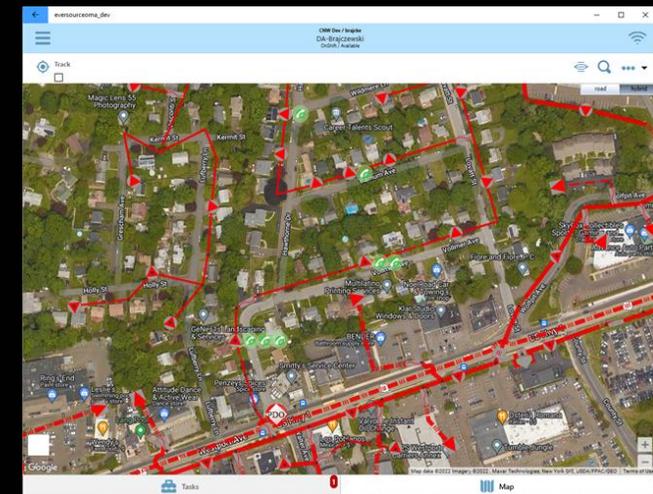
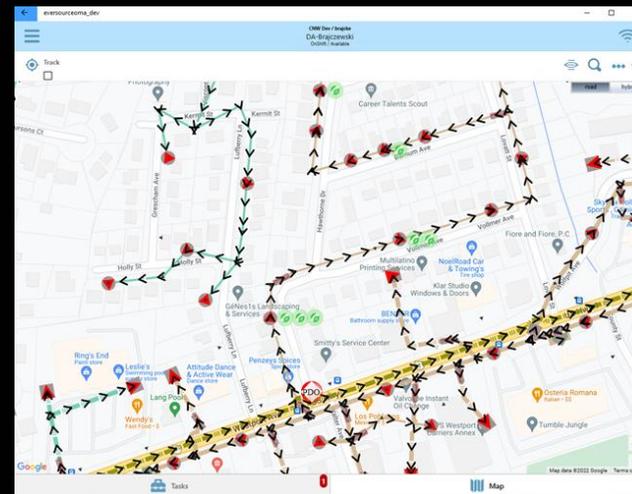
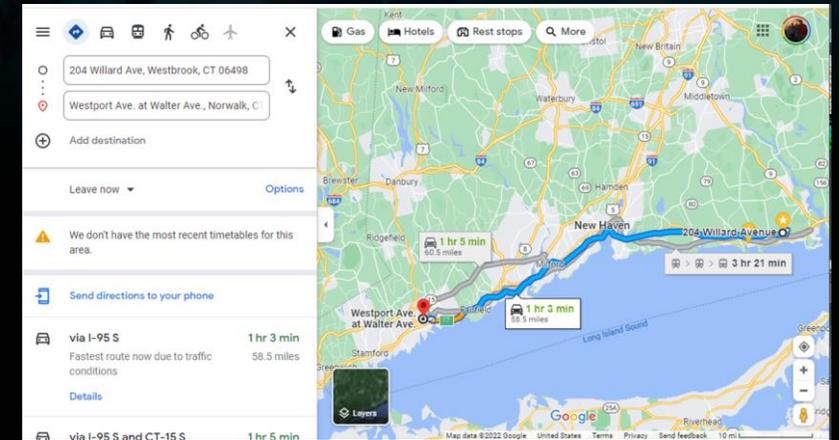
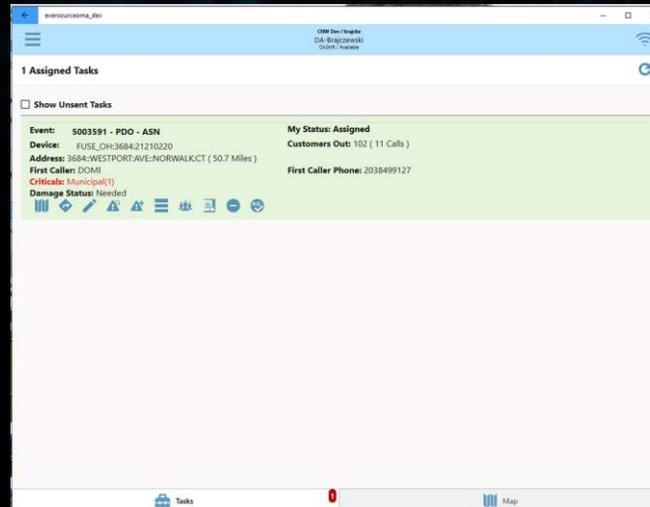
- Mobilizing internal and external damage assessment crews
- Onboarding external crews into the Eversource environment for OMA access (including Active Directory access)
- Replacement and deployment of new laptops to internal damage assessors with built in cellular service
- Automated Roster Callout System (ARCOS) integration to NMS 2.4 for creation, modification and deletion of OMA users and crews
- Cross instance relocation of crews
- Bring your own device (BYOD) capability



# Operation Mobile Application (OMA) for Damage Assessment

## OMA in the field

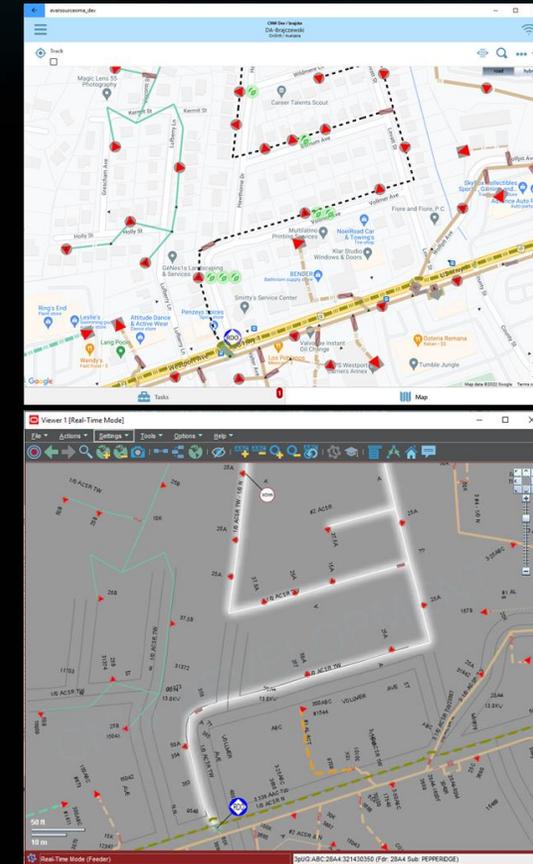
- Real-Time model
- Ability to create outages and non-outages from the OMA map
- Driving directions to the NMS outage or non-outage location
- Feeder trace capability
- Nominal flow direction
- Road/Satellite View (Google map overlay)
- Viewing of documents
- Real-Time GPS tracking in the viewer
- Hide/Display in the viewer
- Map Color Legend



# Operation Mobile Application (OMA) for Damage Assessment

## OMA Integration with the Oracle NMS 2.4 system (2 instances)

- Assignments from NMS to OMA
- Confirmation of device opens based on role type (internal or external)
- Creation of a Real Device Outage (RDO) or Non-Outage (NON)
- Creation of Confirmed Service Outages (CSVO) and Confirmed Secondary Outages (CSCO)
- Creation of one or many damage reports per NMS event location
- Updates to the “Damage Status” in NMS for better coordination of assessments
- Updates to Event Details
- Adding and removing of referrals (work queues)
- Ability for a mobile crew to self release from an assignment
- Ability for a mobile crew to self assign their crew to an event
- Caller details including date/time of call and comments
- Displays Critical Customer types affected
- Allows for setting crew Active, Inactive, On-Shift, Off-Shift, and Unavailable
- Adding pictures or attachments in the field



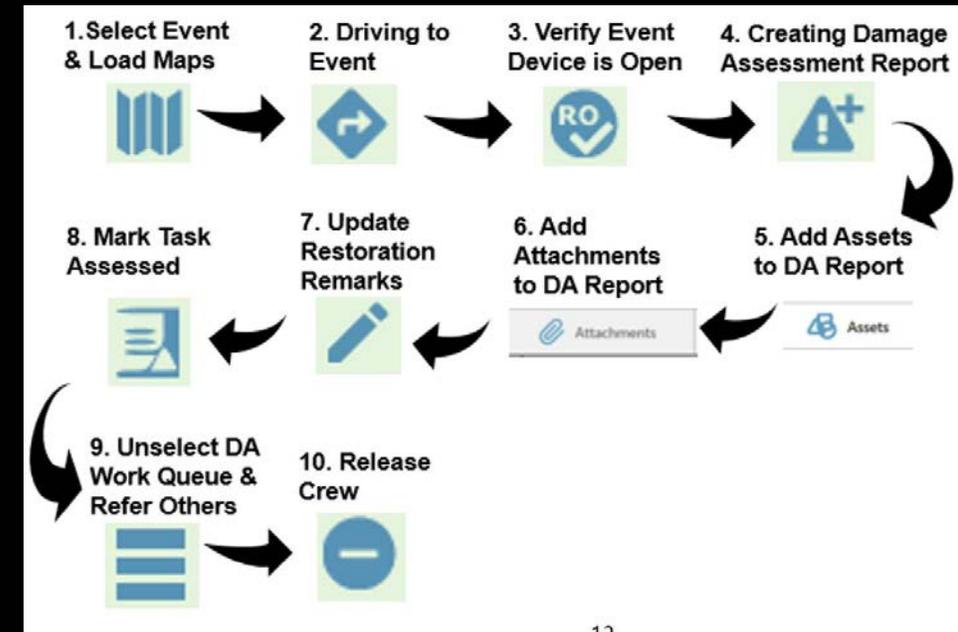
# Operation Mobile Application (OMA) for Damage Assessment

## The Simplified Process

Selects the assigned event and loads the maps

a) Enroute and Onsite hidden for OMA DA users

1. Opens driving direction application to the NMS event location
2. Confirms device in OMA, updating the NMS model
3. Creates initial damage assessment report which marks the assessment as “Started” in NMS and OMA
4. Add one or many damaged assets to the damage assessment report
5. Adds attachment to the damage assessment report
6. Updates restoration remarks with a summary of what was found
7. Marks the assessment for the NMS event as “Assessed” when complete in the field
8. Removes their referral (DA) and adds what other types of crews are needed to fix the damage
9. Release themselves from the event in OMA which releases their crew in NMS



# OMA for Restoration Work

(Extension Pilot)

## Operation Mobile Application (OMA) for Restoration Work

A pilot project at Eversource is currently underway in multiple areas within the Eversource territory, expanding OMA to the internal line forces to perform restoration work dispatched from NMS. OMA's capabilities have been recognized to allow more NMS functionality and tighter integration for sending and receiving NMS jobs in the field.

# Operation Mobile Application (OMA) for Restoration Work

Key deliverables for this extension pilot include the following:

## User and Crew Management

- Mobilizing internal line crews
- Automated Roster Callout System (ARCOS) integration to NMS 2.4 for creation, modification and deletion of OMA users and crews.
- Cross instance relocation of crews
- Bring your own device (BYOD) capability (Available if needed)

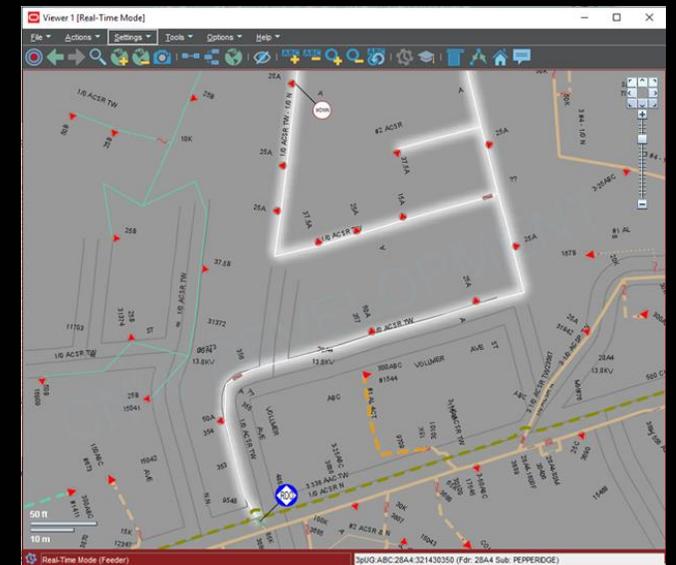
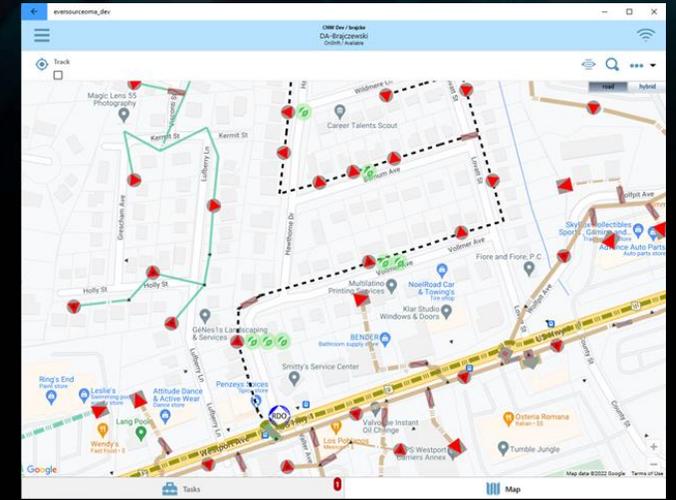
The screenshot shows the 'Crew Makeup' application window. On the left, there are input fields for crew details: Crew ID (brajclox-omaext), Crew Contact Name (Ken Brajczewski), Crew Contact Mobile # (8005753253), Crew Contact Mobile Carrier (Verizon), Crew Contact Alt Mobile #, Crew Manager, Crew Manager Mobile #, Crew Size (1), Crew Type (Line), Temp/Perm (permanent), Control Zone (MADISON AWC), and Mobile App Crew (checked). On the right, there is a 'Personnel' table with columns for Name, Job Title, Employee ID, OMA, and OMA Login Duration. The table contains one entry for Ken Brajczewski, Lineman, 8005753253, Y, and 02:18. Below the table are 'Add...', 'Select Personnel...', and 'Remove' buttons. At the bottom are 'OK', 'Help...', and 'Cancel' buttons.

This screenshot is identical to the one above, but the 'Control Zone' field is now set to 'MASS AVE AWC'. A yellow arrow points from the 'MADISON AWC' field in the top screenshot to the 'MASS AVE AWC' field in this one, indicating a change in the control zone.

# Operation Mobile Application (OMA) for Restoration Work

## OMA Integration with the Oracle NMS 2.4 system (2 instances)

- Assignments from NMS to OMA
- Enroute crew to event
- Onsite crew to an event
- Suspend crew from an event
- Set crew to assigned from an enroute or onsite event
- Confirmation of device opens based on role type (internal or external)
- Force ETA for 911 Emergency events
- Creation of a Real Device Outage (RDO) or Non-Outage (NON)
- Ability to operate by phase
- Creation of Confirmed Service Outages (CSVO) and Confirmed Secondary Outages (CSCO)
- Restoration of open devices, CSVO's and CSCO's
- Restoration of Non-Outage events
- Creation of one or many damage reports per NMS event location



# Operation Mobile Application (OMA) for Restoration Work

## OMA Integration with the Oracle NMS 2.4 system (2 instances)

- Updates to the “Damage Status” in NMS for better coordination of assessments
- Updates to Event Details
- Adding and removing of referrals (work queues)
- Ability for a mobile crew to self release from an assignment
- Ability for a mobile crew to self assign their crew to an event
- Caller details including date/time of call and comments
- Displays Critical Customer types affected
- Allows for setting crew Active, Inactive, On-Shift, Off-Shift, and Unavailable
- Adding pictures or attachments in the field

CNW Dev / brajckx  
brajckx-omaext  
OnShift / Available

brajckx-omaext

### Crew Status and Availability

Crew Status: OnShift Go OffShift

Crew Availability: Available Unavailable...

Select Work Queues

- CBK -> Call Back
- C-C -> Cut and Clear
- DA -> Damage Assessment
- E911 -> E911 Response
- ENV -> Environmental
- FDE -> Field Electrician
- L+T -> Line and Tree Crew
- LNE -> Line Crew
- OFR -> Off Road
- POL -> Pole
- SRV -> Service
- SUP -> Supervisor
- TRB -> Trouble Shooter
- TRE -> Tree Crew
- WGD -> Wire Guard
- > None

Restoration Remarks

5023319 - REAL\_DEVICE\_OUTAGE

Fault Location

System Type  
NSEL-Not\_Selected

Cause  
NSEL-Not\_Selected

Operating Voltage  
NSEL-Not\_Selected

Equipment Involved  
NSEL-Not\_Selected

Isolating Device  
NSEL-Not\_Selected

Weather  
NSEL-Not\_Selected

Conductor Type  
NSEL-Not\_Selected

Action Taken  
NSEL-Not\_Selected

Accessibility  
NSEL-Not\_Selected

Follow Up  
NSEL-Not\_Selected

Notification Type  
NSEL-Not\_Selected

MH Condition Found  
None

MH Caused Damage  
None

MH Cover Condition  
NA

MH Cover Type  
NA

Temporary Repairs Made?

Temporary Repair Notes

Completion Remarks

Validate

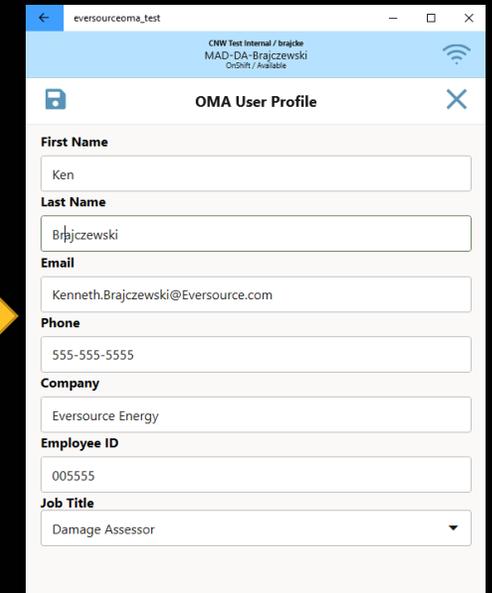
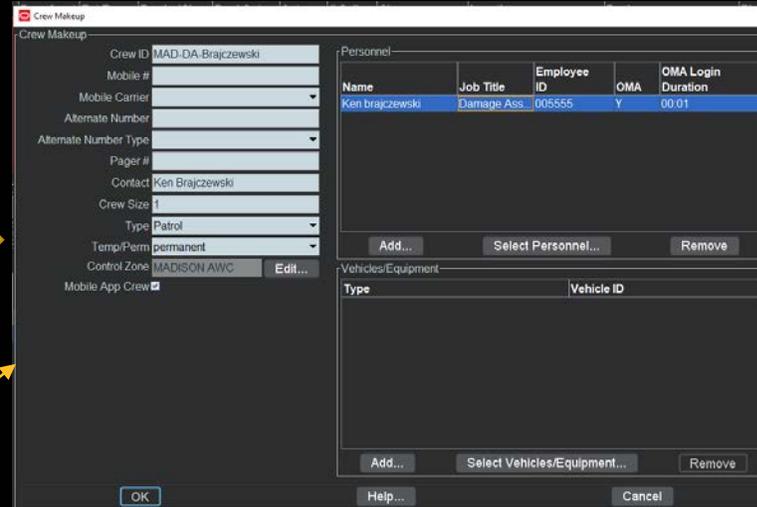
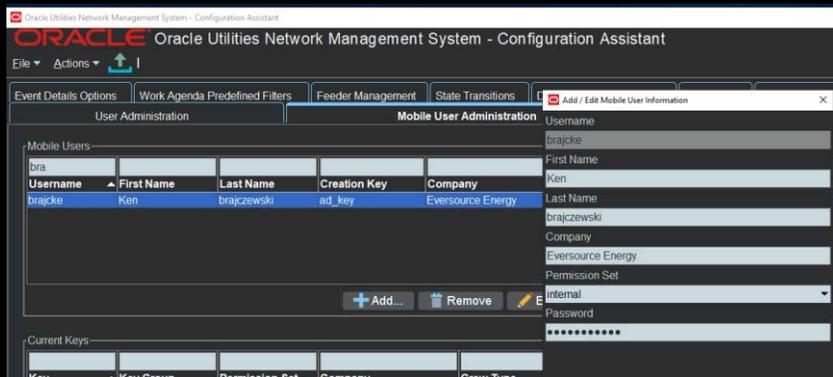
# Operation Mobile Application (OMA) for Restoration Work

## Integration with other crew callout system (OMA DA & Restoration)

Crew and User created in Crew Management System



OMA User Profile created in OMS



# Operation Mobile Application (OMA) for Restoration Work

## Searching Capabilities (OMA DA & Restoration)

Map Search

Search By Alias

Search Type

Alias

Alias:

Wildcard

Wildcard Before and After

Use % for multi-character wild card.  
Use \_ for single-character wild card.

Map Search

Search By Alias

Search Type

Alias

Alias

Customer Account #

Customer Name

Customer Address

Customer Phone

Customer Meter Number

Feeder Name

Substation

Map Search

Search By Alias

Search Type

Alias

Alias:

Wildcard

Wildcard Before and After

Wildcard Before and After

Wildcard After

Wildcard Before

Exact Match

# Operation Mobile Application (OMA) for Restoration Work

## Hide/Display functionality (OMA DA & Restoration)

✓ Hide / Display

Layers Conductors Crews

Landbase  Phase Annotation

Offline Landbase  Non-Main Asset DA

Automatic Landbase  Customer Calls

Structures

Autoload Maps  Big Symbols

Declutter

✓ Hide / Display

Layers Conductors Crews

**Conductor Color**

Feeder

Phase

Nominal Voltage

**Conductor Highlight**

Assessed

Predicted De-energized

Confirmed De-energized

Confirmed De-graded

Flow Direction

✓ Hide / Display

Layers Conductors Crews

**Crew Types**

Service

Trouble

Tree

Line

Eval

Guide

Select All

All Crews

# Operation Mobile Application (OMA) for Damage Assessment

Setting up an OMA user to be a Damage Assessor vs Restoration Worker

Damage Assessor

Crew Makeup dialog box showing configuration for a Damage Assessor. The Crew ID is 'brajckx-omaext' and the Crew Contact Name is 'Ken Brajczewski'. The Crew Contact Mobile # is '8605753253' and the Carrier is 'Verizon'. The Crew Size is '1'. The Crew Type is 'Patrol' (highlighted in green). The Temp/Perm is 'permanent' and the Control Zone is 'MADISON AWC'. The Mobile App Crew checkbox is checked. The Personnel table shows one entry: Ken Brajczewski, Damage Assessor, Employee ID 8605753253, OMA status Y, and OMA Login Duration 00:04. The Vehicles/Equipment table is empty.

Name	Job Title	Employee ID	OMA	OMA Login Duration
Ken Brajczewski	Damage Assessor	8605753253	Y	00:04

Restoration Worker

Crew Makeup dialog box showing configuration for a Restoration Worker. The Crew ID is 'brajckx-omaext' and the Crew Contact Name is 'Ken Brajczewski'. The Crew Contact Mobile # is '8605753253' and the Carrier is 'Verizon'. The Crew Size is '1'. The Crew Type is 'Line' (highlighted in green). The Temp/Perm is 'permanent' and the Control Zone is 'MADISON AWC'. The Mobile App Crew checkbox is checked. The Personnel table shows one entry: Ken Brajczewski, Lineman, Employee ID 8605753253, OMA status Y, and OMA Login Duration 00:06. The Vehicles/Equipment table is empty.

Name	Job Title	Employee ID	OMA	OMA Login Duration
Ken Brajczewski	Lineman	8605753253	Y	00:06

Administration used to determine whether an OMA user has Damage Assessment vs Restoration Work functionality in the OMA application is done at the Crew Makeup level. If a mobile crew has Crew Type = "Patrol", they will have the Damage Assessor functions in OMA. If a mobile crew has Crew Type = "Line", they will have the Restoration Worker functions.

# Operation Mobile Application (OMA) for Damage Assessment

## Damage Assessment

## Restoration Work

Icon	Icon Description	OMA Damage Assessment	OMA Restoration
	Enroute	✗	✓
	Onsite	✗	✓
	Suspend or set to Assign from Enroute or Onsite	✗	✓
	Load Maps	✓	✓
	Driving Directions	✓	✓
	Update Restoration Remarks	✓	✓
	Create a Damage Report	✓	✓
	Display / Search a Damage Report	✓	✓
	Work Queue (Referral)	✓	✓
	Confirm outages (Service and Secondary)	✓	✓
	Mark task as Assessed	✓	✓
	Unassign OMA user from task	✓	✓
	Open Device (Creating a Real Device Open -RDO)	✓	✓
	Restore a task (done from the Event details screen)	✗	✓

# OMA Bring Your own Device (BYOD)

## OMA BYOD – Deployment Options

Implementing a BYOD device proves challenges for all utilities that implement a mobile solution for the industry when implementing OMA or any mobile device technology.

### Challenges:

- Users for OMA external to Eversource do not allow security to control external devices managed by another utility company.
- Eversource needed to avoid leaving data cached by OMA on the physical device, such as electrical maps.
- Users external to Eversource will use different technology for devices (Ipad and Android devices)

### Approach:

- Compare deployment options of OMA to support multiple devices
- Weigh the options to consider pros and cons for implementing an OMA device deployment solution

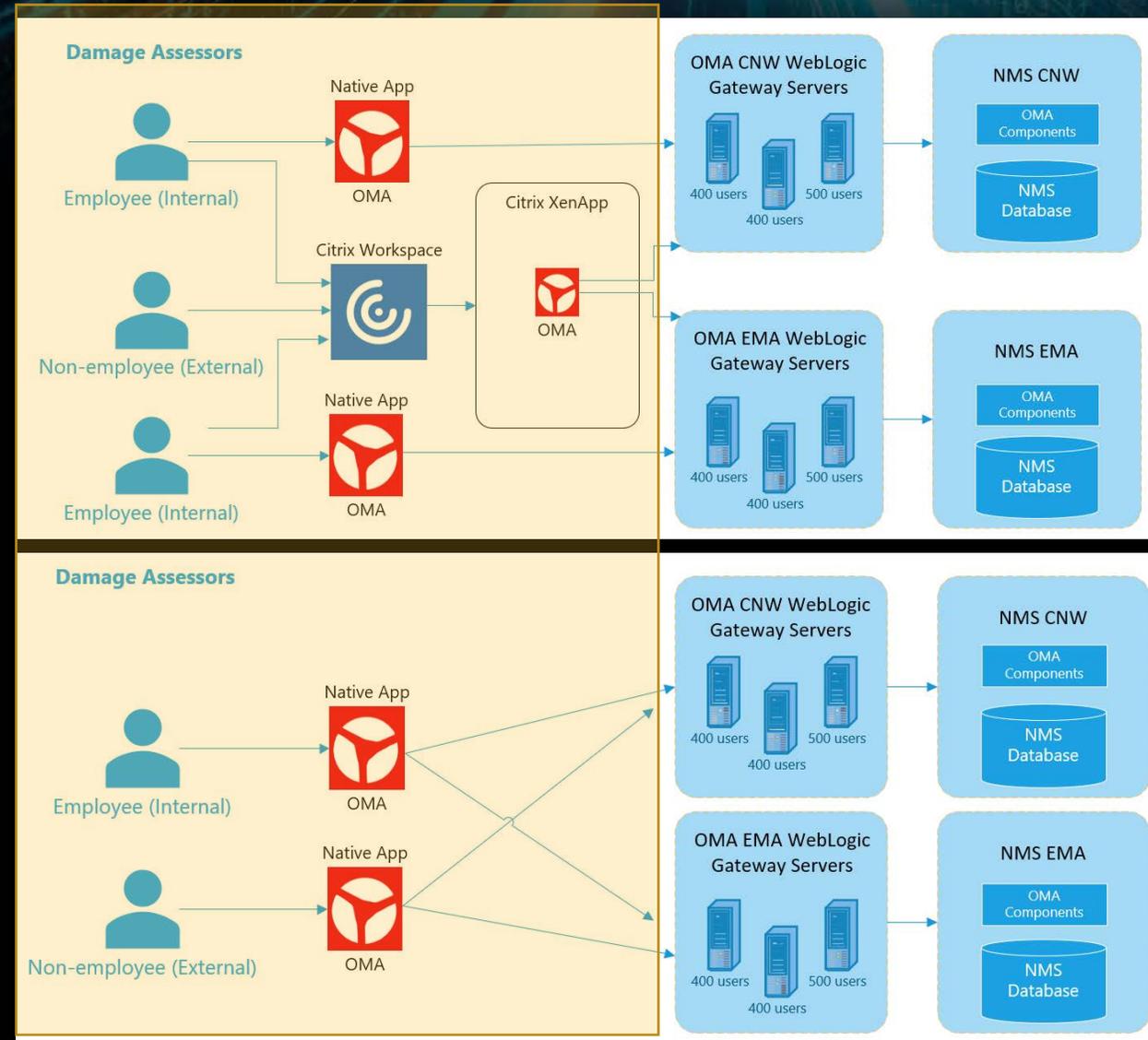
# OMA BYOD – Deployment Options

## Option 1:

- Most Internal Users use **OMA installed natively** on Corp Win10 Laptops
- Some Internal Users access **OMA via Citrix** on Corp iPads
- All External Users access **OMA via Citrix** on Corp iPads

## Option 2:

- Most Internal Users use **OMA installed natively** on Corp Laptop
- Some Internal users use **OMA installed natively** on Corp iPads
- All External Users use **OMA installed natively** on BYOD devices



# OMA BYOD - Overview of Option Comparison

Option 2 offered a lower risk approach to meet the requirements.

NFR	Option 1: Native + Citrix	Option 2: Native Only
Availability	MEDIUM	HIGH
Recovery Time Objective (RTO)	MEDIUM	HIGH
Recovery Point Objective (RPO)	MEDIUM	HIGH
Security	HIGH	HIGH
End User Experience	VARIABLE	HIGH
Change Management	MEDIUM	MEDIUM
Peripheral Support	LOW	HIGH
Cost	HIGH	LOW

# OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>Availability – 99.99% uptime</b>	The ability to work when the edge device is offline is key to achieving the high levels of availability required	<ul style="list-style-type: none"> <li>• A Citrix-deployed app requires an “always on” network connection.</li> <li>• <u>Any</u> network disruption could result in a disconnected or reset session.</li> <li>• During a storm, there is an increased chance of cellular network disruption.</li> </ul>	<ul style="list-style-type: none"> <li>• OMA is designed with a “store and forward” architecture allowing it to continue to work offline.</li> <li>• When network connectivity is re-established, the application automatically synchs with the host.</li> </ul>
	A more simplified architecture reduces the points of failure	<ul style="list-style-type: none"> <li>• While the overall Citrix service is configured for HA, Citrix is a complex solution with many sub-components that could result in a reduction or loss of service for part or all of the user base.</li> </ul>	<ul style="list-style-type: none"> <li>• Deploying the app natively reduces the complexity of the architecture and has fewer points of potential failure</li> </ul>

# OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>Recovery Time Objective (RTO) - &lt; 1 hr.</b>	Full control of the end-to-end infrastructure for OMA will rely on 3 <sup>rd</sup> parties where no SLAs exist.	<ul style="list-style-type: none"> <li>A Citrix-deployed app will be unreachable in a cellular blackout zone, and the resolution will be out of the control of Eversource (Currently, no SLA with Verizon)</li> </ul>	<ul style="list-style-type: none"> <li>A natively deployed app can work offline and is not directly dependent on the cellular network.</li> </ul>
	Full control of the end-to-end infrastructure for OMA will rely on 3 <sup>rd</sup> parties where no SLAs exist.	<ul style="list-style-type: none"> <li>External factors impacting network availability and latency (i.e. A “Denial of Service (DoS)” attack, telco carrier issues, etc.) are outside the realm of control of Eversource, but will impact availability of OMA.</li> </ul>	<ul style="list-style-type: none"> <li>A natively deployed app can work offline and is not constantly dependent on the Internet connection.</li> </ul>

# OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>Recovery Point Objective (RPO) – Zero data loss</b>	Less risk of data loss with a natively deployed app	<ul style="list-style-type: none"> <li>A Citrix-deployed app is at risk of being disconnected during the creation of a transaction.</li> <li>Citrix XenApp sometimes fails to reconnect a disconnected session causing the user to start over</li> </ul>	<ul style="list-style-type: none"> <li>A natively deployed app gracefully recovers from temporary network disruptions so the transaction can be completed.</li> </ul>
	A distributed compute model reduces the risk of data loss compared to a centralized model	<ul style="list-style-type: none"> <li>A single Citrix server failure will impact 10+ running instances of OMA and all in-progress transactions will be lost</li> </ul>	<ul style="list-style-type: none"> <li>The failure of edge device running natively-installed OMA will only impact a single session.</li> </ul>

# OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>Security</b>	Citrix and Native Apps can be configured to offer equivalent security	<ul style="list-style-type: none"> <li>Citrix works with Nu.com domain to authenticate user with Unique IDs/Passwords</li> </ul>	<ul style="list-style-type: none"> <li>Native app works with Nu.com domain to authenticate user with Unique IDs/Passwords (via Azure AD)</li> </ul>

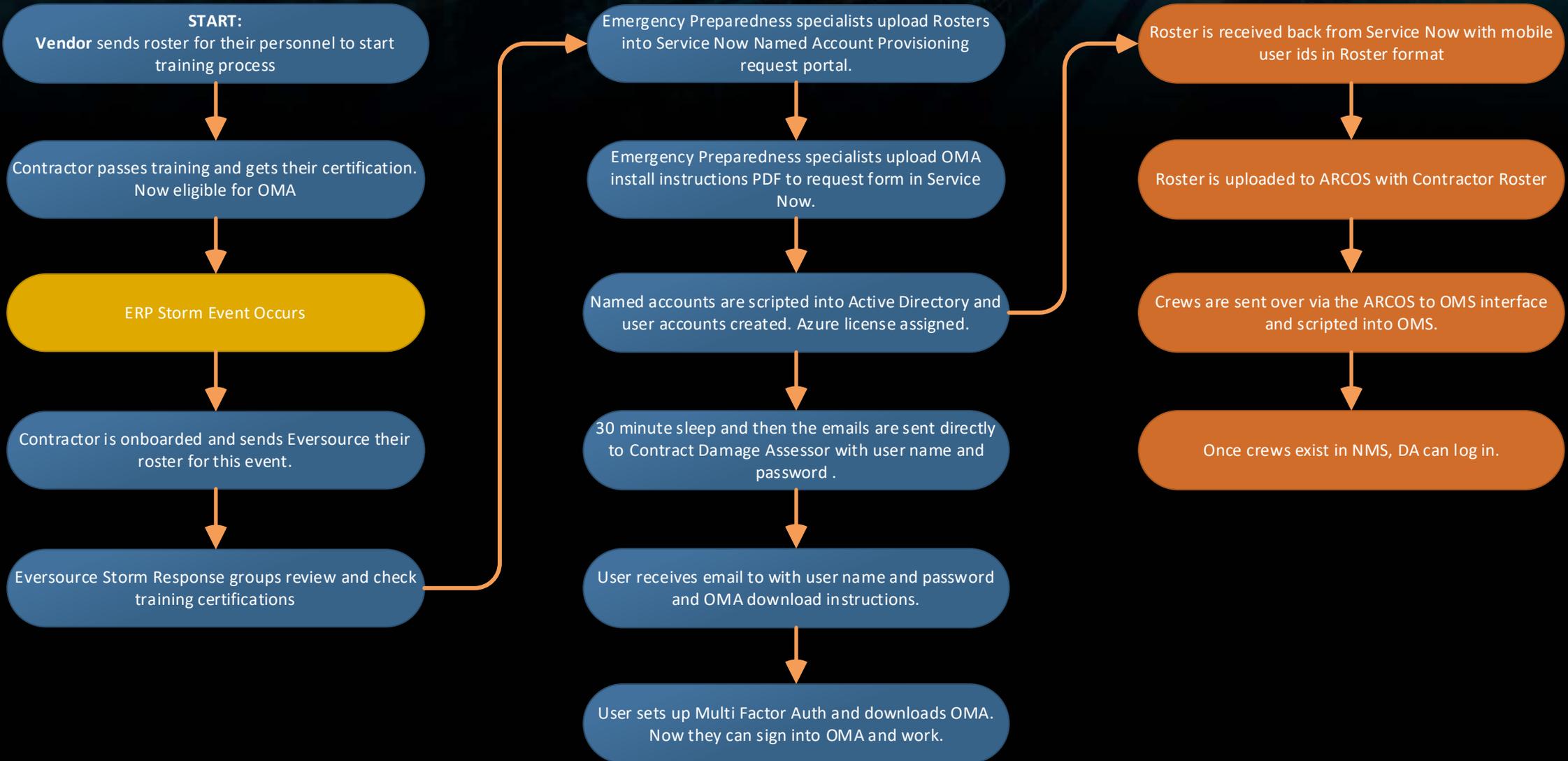
# OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>User Login Experience</b>	Citrix does not support “pass-through” authentication for this application which will result in more steps required to authenticate	<ul style="list-style-type: none"> <li>A Citrix-deployed application will require 2 rounds of authentication:               <ul style="list-style-type: none"> <li>Login and MFA to get into Citrix Storefront, Login again to get into OMA</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>OMA native will only require one round of user authentication making for a better and more productive user experience.</li> </ul>
<b>Performance</b>	Native apps are more responsive, especially on slow networks.	<ul style="list-style-type: none"> <li>The responsiveness of a Citrix-deployed application is heavily dependent on the WAN network latency (must be &lt; 350ms round trip) and the workload on the server</li> </ul>	<ul style="list-style-type: none"> <li>The responsiveness of a natively-deployed application is dependent on the edge device only.</li> </ul>
<b>Edge Device Peripheral Support</b>	Native apps work well with peripherals on the edge device – GPS and Camera	<ul style="list-style-type: none"> <li>Custom Code changes are required in OMA to get GPS to work for a Citrix-deployed application.</li> </ul>	<ul style="list-style-type: none"> <li>OMA native is designed to interface directly with the edge device peripherals</li> <li>OMA relies on an external browser for some features which will result in a different user experience depending on device type.</li> </ul>

## OMA BYOD – Design considerations

NFR	Comments	Option 1: Native + Citrix	Option 2: Native
<b>Cost</b>	Significant cost reduction for avoiding the use of Citrix.	<ul style="list-style-type: none"> <li>• Infrastructure and Software licenses for Citrix</li> </ul>	<ul style="list-style-type: none"> <li>• Apple Device and X-Code license</li> <li>• Microsoft EC3 licenses for each user for InTune.</li> </ul>
<b>Change Management</b>	Similar levels of effort involved with pushing updated versions of code to the end-users	<ul style="list-style-type: none"> <li>• Effort to deploy OMA front-end to Win10 for each code change</li> <li>• Effort to deploy OMA front-end to Citrix Servers for each code change</li> <li>• Custom code changes for Citrix GPS support may need to be re-applied or re-built with each Oracle update.</li> </ul>	<ul style="list-style-type: none"> <li>• Effort to deploy OMA front-end to Win10 for each code change.</li> <li>• Effort to package and deploy OMA front-end for deployment to InTune with each code change (and annually for iOS)</li> </ul>

# Onboarding Process for Contractor DA (Non ES employees) BYOD





# Questions?

Thank You!

# Contact Information

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