



# OTA WITH OMA FOR AUTOMOTIVES

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[www.movimentogroup.com](http://www.movimentogroup.com)

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# Movimento Overview

Automotive & high tech company founded in **2003** and headquartered in **Detroit** with offices in **China, Europe, Mexico** and **Silicon Valley**

**Updating 3M vehicles per year**  
**Equal to 5.5 vehicles 'every' minute**

# Combining Expertise

## Automotive Centers

Detroit – USA



ADAS, Electronics, Infotainment, EV  
Architecture, Manufacturing and  
Operational Technology

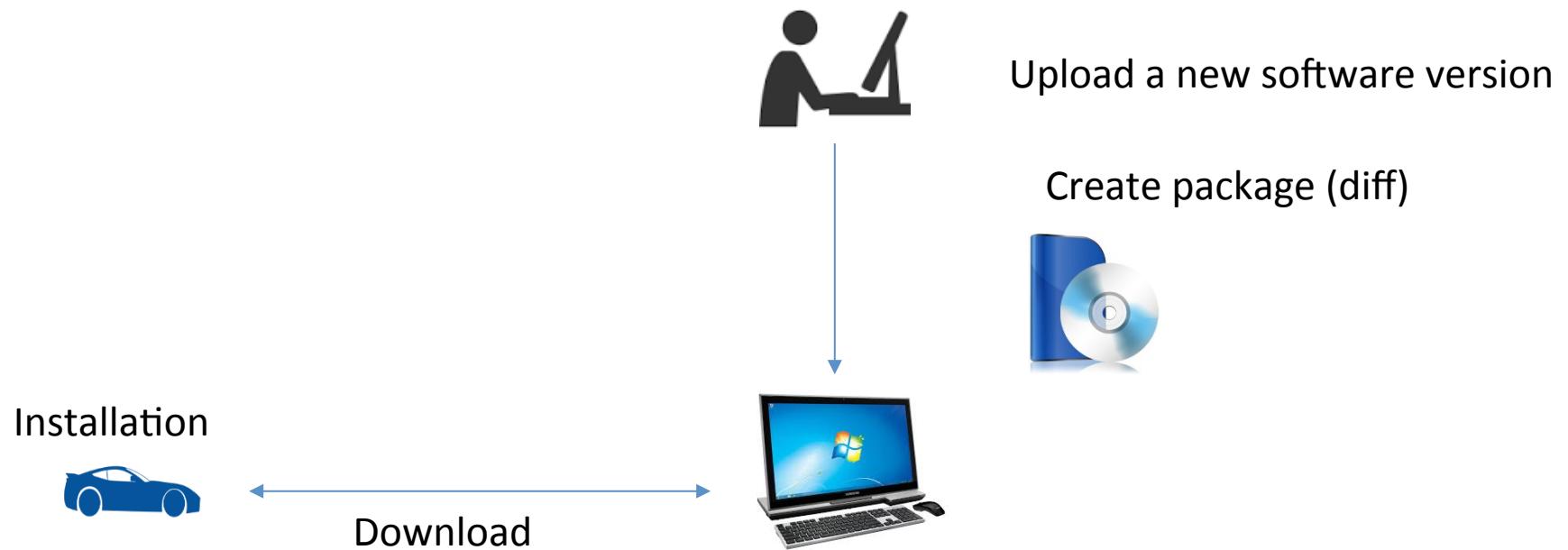
## Technology Center

Silicon Valley – USA



Enterprise Software, Cloud, Internet-of-  
Things, Big Data, Analytics, Security,  
Networking and Information Technology

# Basic Software Update Process



# Software Update Process

Security validation



Reject or postpone download  
New joined member  
Download status update  
Download through USB or others  
Different configuration  
Run multiple operation flow  
Safety, battery and user interrupt

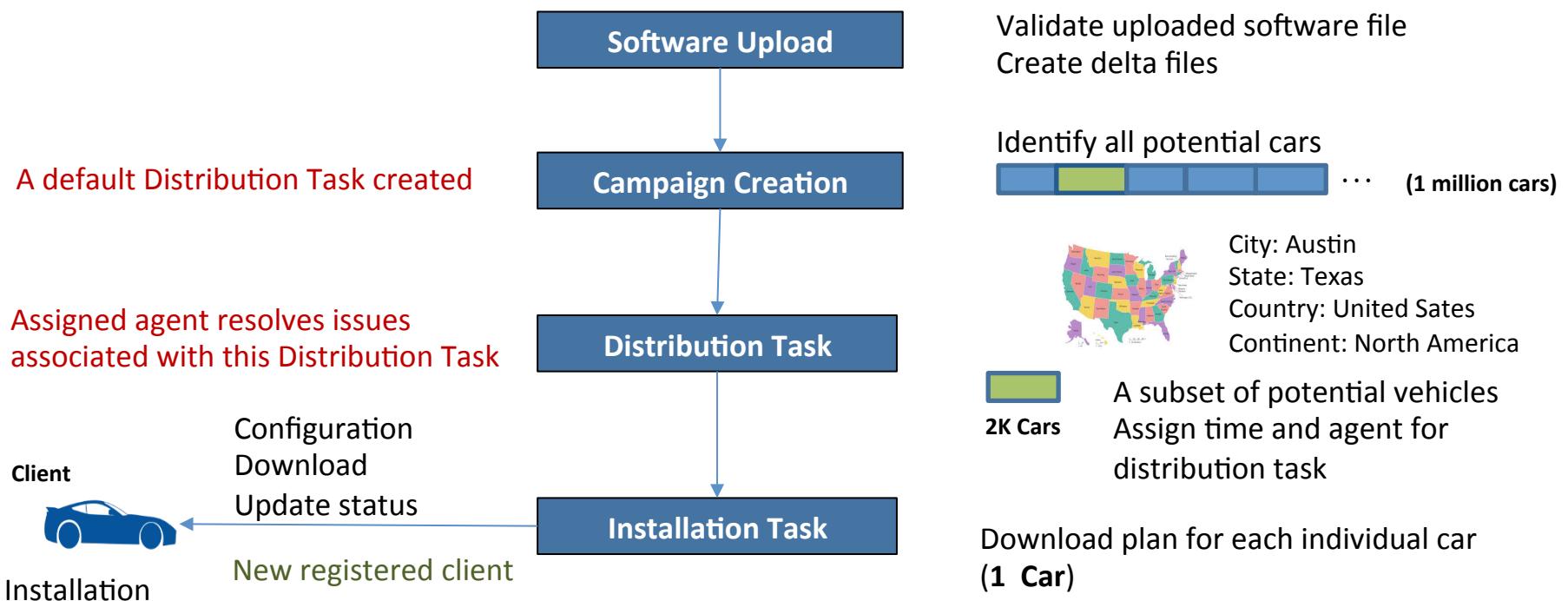


Involve millions of cars  
Validate update software package  
Software dependency  
Multiple communication points  
Multiple packages  
Resolve issue

Peak communication  
Server/agent resource  
Multiple protocols  
Off connection  
Client state track

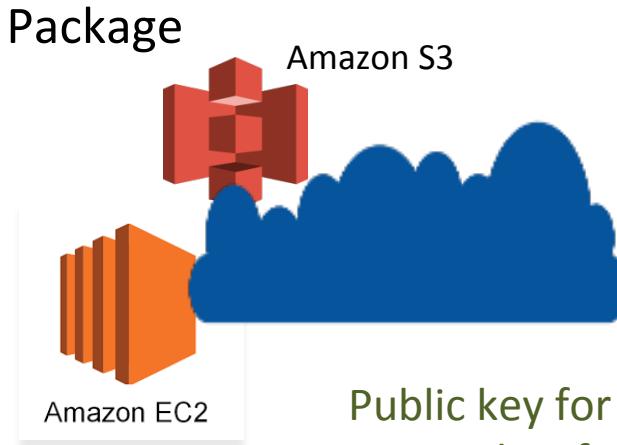
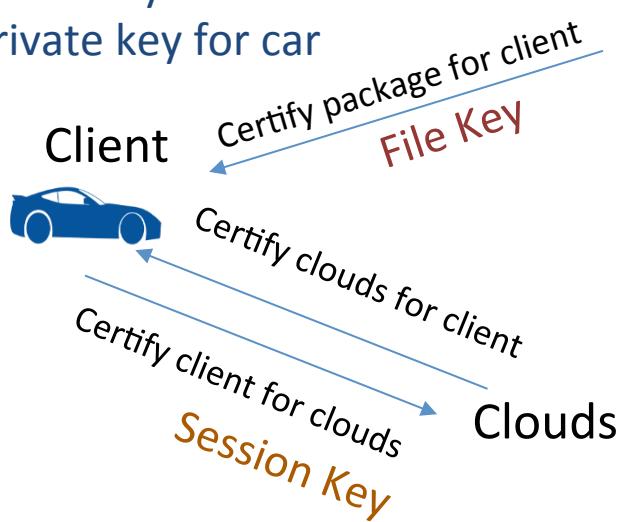
Support different OEM  
Multi-tenancy

# Software Update Operation



# Security Authentication

Public key for cloud  
Private key for car

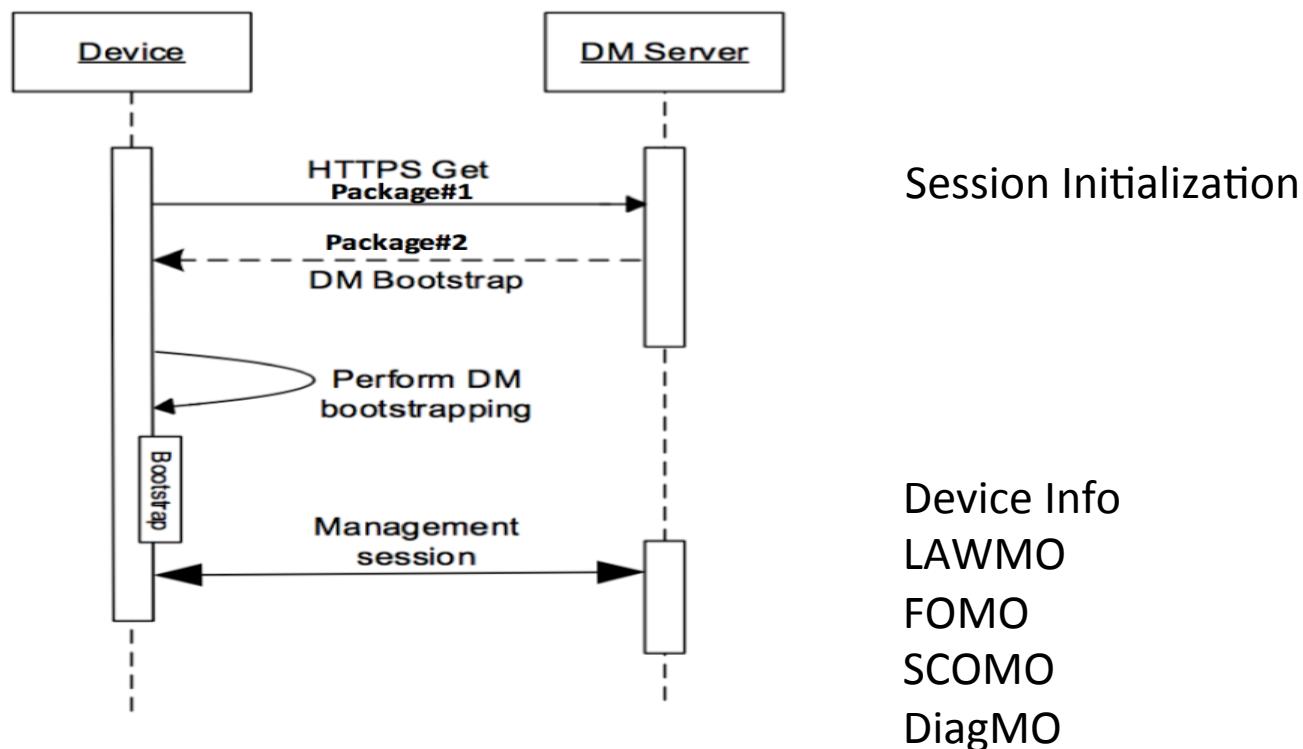


Public key for car Private key for cloud	e-signature to certify clouds
	e-signature to certify client
	e-signature to certify package
	Session key

# OMA Extension for Automotive

- Needs to support different communication protocols
- Needs a default protocol and OMA is the one
- Use OMA DM V2 with JSON
- Support:
  - DLOTA
  - LAMMO
  - FUMO
  - SCOMO
  - DiagMon

# Basic Communication Flow



# Initialization Session

Headers	
<b>Content-Type</b>	application/vnd.oma.dm.initiation+json
<b>Accept</b>	application/vnd.oma.dm.request+json
<b>OMADM-DevID</b>	493005100592800
<b>VIN</b>	493005100592800
<b>Token</b>	vvajas7adbands89abn
<b>Host</b>	www.dms.com
Request Body	
<pre>{   "MOS": [ {     "MOID": "urn:oma:mo:oma-dm-devinfo:1.0",       "MIID": ["miid1"],       {         "MOID": "urn:oma:mo:oma-dm-accinfo:1.2",           "MIID": ["miid1"],           {             "MOID": "urn:oma:mo:oma-fumo:1.0",               "MIID": ["miid1"],               {                 "MOID": "urn:oma:mo:oma-dm-lawmo:1.0",                   "MIID": ["miid1"],                   {                     "MOID": "urn:oma:mo:oma-dm-scomo:1.1",                       "MIID": ["miid1"]                     }                   }                 ]   } }</pre>	

# Device Info

## 1. Server sends command

Response Code	
HTTP	200
Response Body	
{ "CMD": [ "GET", "urn:oma:mo:oma-dm- devinfo:1.0//"] }	

## 3. Server confirms completion

Response Code	
HTTP	200
Response Body	
{ "CMD": [["END"] ] }	

## 2. Client sends Device Info

Headers	
<b>Content-Type</b>	application/vnd.oma.dm.initiation+json
<b>Accept</b>	application/vnd.oma.dm.request+json
<b>OMADM-DevID</b>	493005100592800
<b>VIN</b>	493005100592800
<b>Token</b>	vvajas7abbands89abn
<b>Host</b>	www.dms.com
Request Body	
{ "Status": [ { "sc": 200 } ], "ClientURI": "oma:mo:oma-dm-devinfo:1.0//", "MOData": { "DevInfo": { "DevID": "493005100592800", "Man": "Vendor", "Mod": "model-number", "DmV": "2.0", "Lang": "en", "DevType": "headunit", "OEM": "panasonic", "FwV": "firmware0.4", "SwV": "Vendor1.2", "HwV": "" } } }	

# LAWMO

## 1. Server sends wipe command

Response Code	
HTTP	200
Response Body	
{	
"CMD": [	["EXEC", "urn:oma:mo:oma-dm-lawmo:1.0//Operation/Wipe"]
]	
}	

## 2. Client inform using sync or async mode

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
"Status": [	
{"sc": 1200, "URI": ["urn:oma:mo:oma-dm-lawmo:1.0//Operation/Wipe"]}	
]	
}	

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
"Status": [	
{"sc": 202, "URI": ["urn:oma:mo:oma-dm-lawmo:1.0//Operation/Wipe"]}	
]	
}	

## 3. Client inform operation status

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
"Alert": [	
{"AlertType": "urn:oma:at:lawmo:1.0:OperationComplete", "SourceURI": "urn:oma:mo:oma-dm-lawmo:1.0//Operations/Wipe", "Mark": "Information", "DataType": "application/json", "Data": {}}	
{"ResultCode": 1200, "State": "30"}	
}	
}	

## 4. Server confirms completion

Response Code	
HTTP	200
Response Body	
{	
"CMD": [	["EXEC", "urn:oma:mo:oma-dm-lawmo:1.0//Operation/Wipe"]
]	
}	

# FUMO

## 1. Server sends FUMO command

Response Code	
HTTP	200
Response Body	
{ "CMD": [ ["GET", "urn:oma:mo:oma-dm-fumo:1.0://"] ] }	

## 3. Server confirms completion

Response Code	
HTTP	200
Response Body	
{ "CMD": [ ["END"] ] }	

## 2. Client FUMO info to server

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
	"Status": [{"sc": 200}],
	"ClientURI": "urn:oma:mo:oma-dm-fumo:1.0://",
	"MOData": {
	"fumo": {
	"PkgName": "pkg493005100592800",
	"PkgVersion": "Version",
	"DownloadAndUpdate": {
	"PkgURL": "url"
	},
	"State": "10"
}	}

# FUMO Update

## 1. Server sends HGET command

HTTP		Response Code
		200
Response Body		
{	"CMD": [	
	["HGET",	
	"urn:oma:mo:oma-dm-scomo:1.1//Download/<PkgID>/PkgURL"],	
	["EXEC", "urn:oma:mo:oma-dm-scomo:1.0// Download/<PkgID>/Operations/DownloadInstall"]	
	]	
}		

## 2. Client sends status

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
	"Alert": [
	{
	"AlertType": "urn:oma:at:scomo:1.0:OperationComplete",
	"SourceURI": "urn:oma:mo:oma-dm-scomo:1.1// Download/<PkgID>/Operations/DownloadInstall",
	"Mark": "Information",
	"DataType": "application/json",
	"Data": {
	"ResultCode": 200
	"State": "20"
	}
	}
}	

## 3. Server confirms completion

Response Code		
HTTP		200
Response Body		
{	"CMD": [	["END"] ] }

# SCOMO

## 1. Server sends FUMO command

Response Code	
HTTP	200
Response Body	
{ "CMD": [ ["GET", "urn:oma:mo:oma-dm-scomo:1.1//"] ] }	

## 2. Client sends package info to server

Headers	
<b>Content-Type</b>	application/vnd.oma.dm.initiation+json
<b>Accept</b>	application/vnd.oma.dm.request+json
<b>OMADM-DevID</b>	493005100592800
<b>VIN</b>	493005100592800
<b>Token</b>	vvajas7adbands89abn
<b>Host</b>	www.dms.com
Request Body	
{	
"Status": [{"sc": 200}],	
"ClientURL": "urn:oma:mo:oma-dm-scomo:1.1//",	
"MOData": {	
"scomo": {	
"Download": {	
...	
},	
"Inventory": {	
...	
}	
}	
}	

## 3. Server confirms completion

Response Code	
HTTP	200
Response Body	
{ "CMD": [ ["END"] ] }	

# Software Update

## 1. Server sends HGET command

HTTP		Response Code
		200
Response Body		
{	"CMD": [	
	["HGET",	
	"urn:oma:mo:oma-dm-scomo:1.1//Download/<PkgID>/PkgURL"],	
	["EXEC", "urn:oma:mo:oma-dm-scomo:1.0// Download/<PkgID>/Operations/DownloadInstall"]	
	]	
}		

## 2. Client sends status

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005100592800
VIN	493005100592800
Token	vvajas7adbands89abn
Host	www.dms.com
Request Body	
{	
	"Alert": [
	{
	"AlertType": "urn:oma:at:scomo:1.0:OperationComplete",
	"SourceURI": "urn:oma:mo:oma-dm-scomo:1.1// Download/<PkgID>/Operations/DownloadInstall",
	"Mark": "Information",
	"DataType": "application/json",
	"Data": {
	"resultCode": 200
	"state": "20"
	}
	}
}	

## 3. Server confirms completion

Response Code		
HTTP		200
Response Body		
{	"CMD": [[{"END"}]]	}

# Device Registration

## 1. Client send request

Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	4930121223
VIN	493005100591233
Host	www.dms.com
Body	
<pre>{   "ClientURI": "oma:mo:oma-dm-devinfo:1.0//",   "MOData": {     "DevInfo": {       "DevID": "HUS100592800",       "Man": "Vendor",       "Mod": "model-number",       "DmV": "2.0",       "Lang": "en",       "DevType": "headunit",       "OEM": "panasonic",       "FwV": "firmware0.4",       "SwV": "Vendor1.2",       "HwV": "",       "Ext": {         "VIN": "493005100591233",         "EncryptedVIN": "ABJHABD^UVBJA"       }     }   } }</pre>	

## 2. Server response

Response Code					
HTTP	200				
<table border="1"> <thead> <tr> <th colspan="2">Response Body</th> </tr> </thead> <tbody> <tr> <td colspan="2"> <pre>{   "ClientURI": "oma:mo:oma-dm-dmacc:1.2//",   "MOData": {     "DmAcc": {       "SrvID": "server identifier for the dm server",       "SrvURI": "DM Server endpoint",       "Auth": {         "Trsp": {           "Data": "Server Communication Certificate",           "Secret": "Encrypted Session Token"         }       }     }   } }</pre> </td></tr> </tbody> </table>		Response Body		<pre>{   "ClientURI": "oma:mo:oma-dm-dmacc:1.2//",   "MOData": {     "DmAcc": {       "SrvID": "server identifier for the dm server",       "SrvURI": "DM Server endpoint",       "Auth": {         "Trsp": {           "Data": "Server Communication Certificate",           "Secret": "Encrypted Session Token"         }       }     }   } }</pre>	
Response Body					
<pre>{   "ClientURI": "oma:mo:oma-dm-dmacc:1.2//",   "MOData": {     "DmAcc": {       "SrvID": "server identifier for the dm server",       "SrvURI": "DM Server endpoint",       "Auth": {         "Trsp": {           "Data": "Server Communication Certificate",           "Secret": "Encrypted Session Token"         }       }     }   } }</pre>					

## 3. Client confirmation

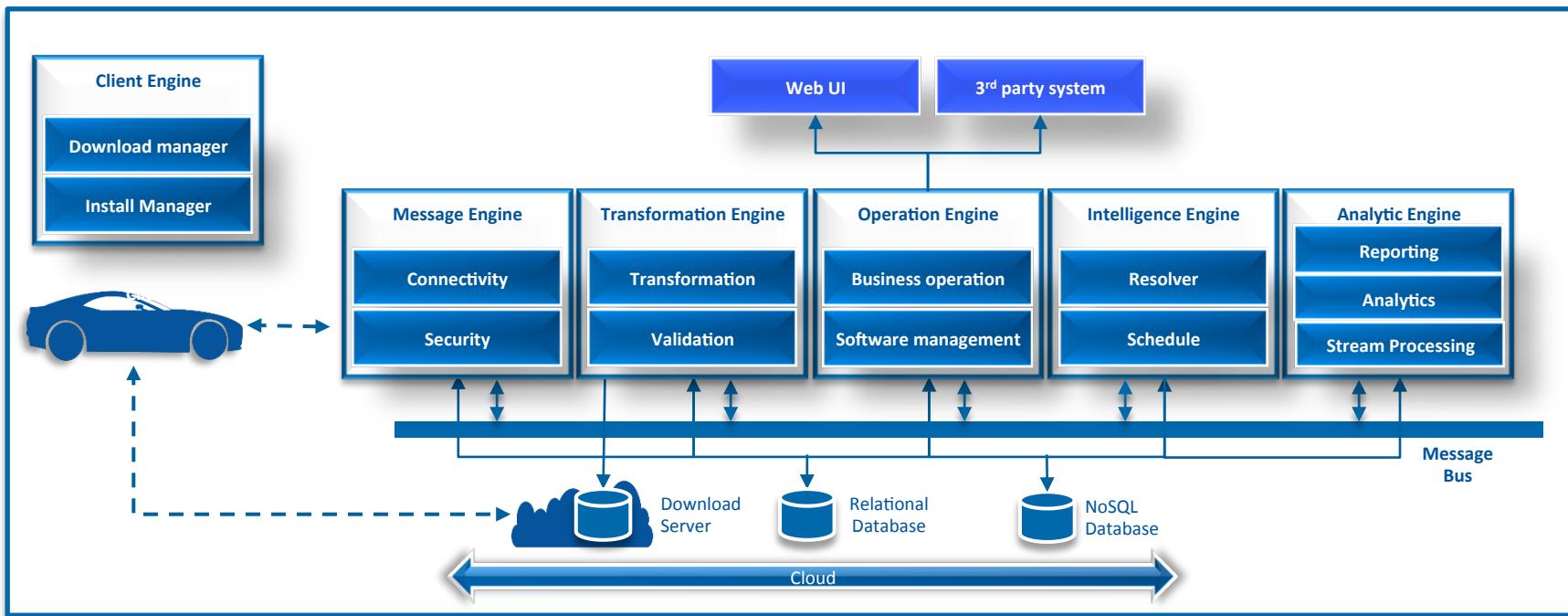
Headers	
Content-Type	application/vnd.oma.dm.initiation+json
Accept	application/vnd.oma.dm.request+json
OMADM-DevID	493005121200
Token	vvajas7adbands89abn
VIN	493005100592800
Host	www.dms.com
Request Body	
<pre>{   "Alert": [     {       "AlertType": "urn:oma:at:dm:2.0:BootstrapComplete",       "Mark": "Information",       "DataType": "application/json",       "Data": {         "ResultCode": 200,         "State": ""       }     }   ] }</pre>	

Response Code					
HTTP	200				
<table border="1"> <thead> <tr> <th colspan="2">Response Body</th> </tr> </thead> <tbody> <tr> <td colspan="2"> <pre>{   "Responsecode": "401",   "Description": "Unauthorized", }</pre> </td></tr> </tbody> </table>		Response Body		<pre>{   "Responsecode": "401",   "Description": "Unauthorized", }</pre>	
Response Body					
<pre>{   "Responsecode": "401",   "Description": "Unauthorized", }</pre>					

# Unified OTA Platform

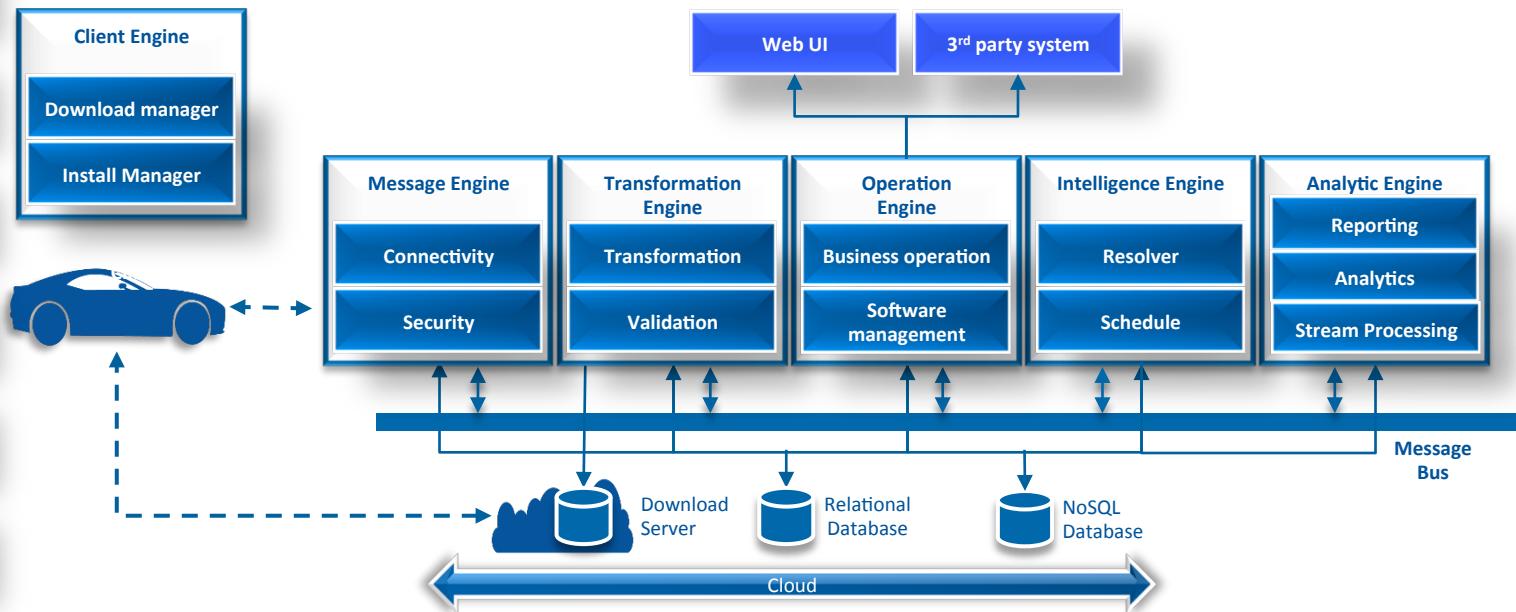


# High Level Architecture



# Key Properties

- Real-Time
- Scalability
- Extensibility
- Flexibility
- Security
- Adaptability
- Manageability



# Conclusion

- OTA for automotive
- Motimento Unified OTA platform
- Default communication protocol is OMA
  - Registration
  - Provisioning (security)
  - Configuration
  - Use the extension with
    - DLOTA
    - LAMMO
    - FUMO
    - SCOMO
- Progress with
  - Stream processing patterns
  - State flow control
  - Services

# THANK YOU



**Tao Lin, PhD  
Distinguished Architect & VP of Engineering, Movimento**



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