STREAMLINING YOUR CUSTOMER’S INFRASTRUCTURE WITH THE AVAYA AURA® MEDIA SERVER (AAMS)

Lisa Marinelli
Senior Product Manager,
Team Engagement Solutions
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AAMS Overview

Comparing AAMS-CM with Media Gateways

AAMS Deployment Options and Licensing

Streamlining Your Customer’s Infrastructure

Customer Example
AAMS IN AVAYA AURA® 7.X

Applications
- Avaya Aura Presence Services
- Avaya Aura Messaging
- Avaya Aura Contact Center
- Avaya Aura Experience Portal

Applications and Snap-Ins

Avaya Session Boarder Controller for Enterprise

Avaya Aura® Session Manager

Avaya Aura® Device Services

Avaya Aura® Communicator Portfolio

Avaya Aura® System Manager

Avaya Scopia® Desktop and Mobile Clients

Avaya Aura® Conferencing

Avaya SIP endpoints

3rd Party PBXs

IP Office Branch
Distributed Or Centralized

Avaya Aura® for Survivable Remote

Avaya CS 1000

Avaya Aura® Communication Manager

Avaya G Series Gateway

AES

PSTN

SIP Trunks

TDM Trunks

Avaya Aura® Media Server

AC3.0
WHAT IS AAMS?

- AAMS is a software-based media server, providing soft DSP/media channel resources on general-purpose hardware, with multiple deployment options.

- With the introduction of Avaya Aura® 7.0, Communication Manager (CM) 7.0 adds the Avaya Aura® Media Server (AAMS) 7.7 as a media resource.

- For Avaya Aura® 7, AAMS will provide IP audio functionality equivalent to Media Gateways (MG) and Port Networks (PN)
AAMS PROVIDES FEATURES NOT OFFERED BY MGS/PNS

- Virtualization Option
- High channel density
- No playback announcement limits
- Additional codecs such as G.722
- Deployment Flexibility: Both Avaya-provided and BYO server hardware options for both virtualized (VE) and non-virtualized (Software Only/PVI) deployments.
AAMS IS A MATURE TECHNOLOGY, UTILIZED BY OTHER ADOPTERS

- Avaya Aura Contact Center 6.x
- Avaya Aura Conferencing 7.x/8.x
- Avaya Aura AS5300 Federal/DoD
- Avaya CS1000
- Avaya ACE/ Foundation Toolkit
- Avaya Notification Server
- Avaya Breeze™ (formally Collaboration Environment 2.x/3.x/Engagement Development Platform (EDP) 3.1)
AAMS-CM KEY FEATURES

- Transcode G.711, G.729, G.726, G.722 codecs. OPUS support arriving in future feature pack release
- High channel density: Up to 4000 simultaneous media channels per instance (“Server Appliance”/“Bare Metal”)
- Virtualization option (OVA)
- High Availability (1+1) option
- Runs on general-purpose hardware, virtualized or directly on an OS
- Multiple AAMS instances can support multiple CM instances
- No total recording time limits for AAMS Announcements (limited only by AAMS HDD)
- No playback channel limits for AAMS Announcements (limited only by number of licensed media channels)
AAMS-CM AUDIO FUNCTIONALITY

- PN/MG-equivalent IP audio functionality
- IP Audio
  - Audio codec types, (G711u/A, G729, G726, G722, future: OPUS)
  - Encryption (AES128, AES256)
  - Connectivity between AAMS and
    - AAMS | MGs | PNs | IP stations | IP trunks
- Conferencing and Connectivity
  - Ad-hoc, meet-me (CM ad-hoc limited to 6 speakers)
  - Group Paging, Service Observing, Call Recording
- Tone Generation
  - Call Progress Tones, Multi-National, DTMF
- Tone Detection
  - DTMF, Answer Machine
- Sourcing of Announcements and Music on Hold
CM’S MEDIA RESOURCE CAPACITIES AND OPTIONS

1. 0 to 250 AAMS
2. 0 to 64 legacy port networks (G650)
3. 0 to 250 legacy media gateways (G350/430/450/700)
   ▸ Mix and match above three options in any combination.
   ▸ Subject to CM channels limits:
     – Large CM – 40,000 DSP/media channels
     – Medium CM – 12,000 DSP/media channels
     – Small CM – 5,000 DSP/media channels
   ▸ All may be geographically distributed
   ▸ PNs, MGs, AAMSs – common pool of media resources
AAMS-CM ENGINEERING THE SOLUTION

- AAMS signaling via SIP/MSML directly to CM.
  - Session Manager not in the path of CM and AAMS.
- No SIP trunks or SIP trunk groups are consumed
- AAMS 7.7 adoption requires CM 7.
  Note: CM 6.X and earlier versions cannot utilize AAMS.
- AAMS does not impact call flow
CALL FLOWS FOR SIP AND H323 UNAFFECTED BY AAMS

Endpoint Signaling unaffected by AMS

MG and shuffiling for SIP and H323 phones

PN and shuffling for SIP and H323 phones
HOW DOES AAMS AFFECT SURVIVABILITY?

- Current survivability depends on Port Networks and/or Media Gateways to trigger the failover and recovery
- In an AAMS environment, there might not be any PN or MG
- So CM relies on status information relayed by AAMS as an additional trigger for failover and recovery
MAIN CM FAILURE

- During normal operation, the Main CM and the Survivable Processor are both communicating status to the AAMS.
- If the Main CM dies, the AAMS will tell the Survivable Processor that the Main CM is no longer reporting status.
- This will cause the Survivable Processor to become active.
- Similarly to recovery with Port Networks and Media Gateways, control is not returned to the Main CM until the recovery rule is met (manual, automatic or scheduled).
NETWORK FAILURE

- If the network fails, AAMS3 and AAMS4 will tell the Survivable Processor that the Main CM is no longer reporting status.
- This will cause the Survivable Processor to become active to serve the part of the network that it can reach.
- Meanwhile, the Main CM continues to serve the part of the network that it can reach.
- The Split Registration Prevention feature, if enabled, prevents phones that registered with Survivable Processor from registering back to Main CM until the recovery is complete.
ADMINISTRABLE SURVIVABILITY CONTROLS

- An AAMS timer (default 180 seconds) specifies how long the CM main server must be not reporting before AAMS moves to the CM survivable processor
  - Set high to prevent failover when Main reboots or during brief network outages
  - Set low to provide a more rapid failover

- Server priorities control whether servers take over in parallel or hierarchically
  - Parallel survivable servers handle regional outages
  - Hierarchical survivable servers provide additional levels of protection
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## COMPARING AAMS-CM WITH MEDIA GATEWAYS

<table>
<thead>
<tr>
<th>Media Function</th>
<th>AAMS-CM</th>
<th>G Series Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic media resource capabilities: connections, conferences, tones, play and record announcements, digit collection</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Announcement Recording Limits</td>
<td>None (up to size of HDD)</td>
<td>45 min or 250 min (G450,) depending on memory kit used. 60 min per VAL board.</td>
</tr>
<tr>
<td>Announcement Channel Capacity</td>
<td>Practically Unlimited (up to # purchased channels)</td>
<td>63 (31 for port networks)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gateway Function</th>
<th>AAMS-CM</th>
<th>G Series Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDM interfaces for digital, analog stations and trunks</td>
<td>N/A</td>
<td>X</td>
</tr>
<tr>
<td>V.150.1 (Modem-over-IP)</td>
<td>N/A</td>
<td>X</td>
</tr>
<tr>
<td>T.38 Fax</td>
<td>N/A</td>
<td>X</td>
</tr>
<tr>
<td>Codecs: G711, G729, G726</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Codecs: G722 (ad hoc conferencing)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Codecs: OPUS [Avaya Aura® 7.0.1]</td>
<td>X</td>
<td>X (narrow-band)</td>
</tr>
<tr>
<td>Maximum DSP/channel count per instance</td>
<td>4000*</td>
<td>320</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other capabilities</th>
<th>AAMS-CM</th>
<th>G Series Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share with multiple CM's</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Multiple instances can service one CM</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Survivability in CM environment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Virtualization</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Redundancy</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Capacity</td>
<td>250 AAMSs</td>
<td>250 Gateways</td>
</tr>
</tbody>
</table>

* Bare Metal/Server Appliance deployment option. Codec, feature mix, and server hardware will affect maximum capacity.
AAMS-CM VS. MEDIA GATEWAY USE CASES

- **Best fit for AAMS with CM**
  - Call center requiring lots of DSP resources for call recording, announcements or IVR applications (digit collection)
  - Customers with MCC or G650 cabinets looking to reduce their footprint as they upgrade and transition to IP
  - All IP construct (H.323 or SIP endpoints) with high DSP/media channel requirements

- **Best fit for Gateways with CM**
  - All TDM environment (not ready for all IP)
  - Mixed TDM and IP environment
  - Gateways are required to support analog phone devices
  - T.38Fax machines
  - modems
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AAMS-CM FOUR DEPLOYMENT OPTIONS

- **Virtualized** (i.e. utilizing a VMware environment), AAMS in an OVA
  - **Option 1:** AVP (Avaya Virtualization Platform) = An Avaya-provided server with VMware and one or more AAMS OVA instances **[1400 (May 2016)]**
  - **Option 2:** VE (Virtualized Environment) = A customer-provided server with VMware and one or more AAMS OVA instances **[1400 (May 2016)]**

- **Non-virtualized** (i.e. utilizing an operating system such as Redhat Linux), AAMS via an AAMS installer
  - **Option 3:** Server Appliance (“Bare Metal”) = An Avaya-provided server with Redhat Linux and one pre-installed AAMS instance.
    1. Large/High-Capacity Server **[4000]**
    2. Small/Standard-Capacity Server **[1700]**
  - **Option 4:** Software Only (aka: PVI, Platform Vendor Independence) = A customer-provided server with an operating system (e.g. Redhat Linux) and one AAMS instance **[varies, maximum is 4000]**

  [ ] indicates approximate maximum simultaneous channel capacity of each deployment option. Server hardware and Codec and feature mix will affect capacity.
AAMS-CM DEPLOYMENT USE CASES

- Best fit for AAMS CSR3 Bare Metal with CM
  - Call center requiring lots of DSP resources for call recording, announcements or IVR applications (digit collection)
  - Data Center with multiple CM systems (SIP trunks, H.323 or SIP endpoints)
  - Can be shared in conjunction with CPOD

- Best Fit for AAMS as virtual appliance on VMWare (VE) or AVP
  - UC systems with average DSP usage
  - Customers with MCC or G650 cabinets looking to reduce their footprint as they upgrade and transition to IP

- Best fit for AAMS on AVP
  - Branch locations
LICENSING INFORMATION

- Two types of licenses: 1) Media channel and 2) Instance

1. AAMS Media Channel Licenses
   - Each CM license file has a new feature keyword VALUE_CM_AMS_VOIP_CHLS and a count
   - The count is the limit of **simultaneous** media channels that may be established by CM across a set of AAMSs
   - CM can establish media channels on any CM-administered AAMS, up to the limit specified in the CM license file
   - The license file specifies a CM-allowed limit, which is independent of any specific AAMS instance.
   - CM enforces the channel limit.
   - HA configuration **does not** require purchasing additional channel licenses.
LICENSING INFORMATION

1. AAMS Instance Licenses
   - Each AAMS server (bare metal, AVP/VE, etc.), must obtain an instance license from the customer’s WebLM server.
   - AAMS WebLM license key/file (one per customer) is created by PLDS and contains the number of licensed AAMS servers.
   - WebLM license file is configured with N number of server instance licenses.
   - As an AAMS instance comes up (including HA instances,) it requests a server instance license.
   - The N instance licenses are not bound to a particular AAMS instance.
   - AAMS will periodically refresh its license with the WebLM server.
   - If an AAMS instance fails or is removed, the license refresh with the WebLM server would not occur, and thus, the WebLM server may hand out that instance license to another AAMS instance.
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AVAYA AURA® MEDIA SERVER ADOPTION BY COMMUNICATION MANAGER

FROM

13 G450 Gateways, 4160 channels: 39U of rack space, potentially 2 racks

TO

MASSIVE FOOTPRINT REDUCTION

1 Server (dedicated, non-virtual) up to 4000 AAMS channels: 1U of rack space
TCO – FOOTPRINT REDUCTION 4000 CHANNELS IN 42U RACKS

AAMS [1U]

G450 [x 3U]

13 MGs = 39U of rack space, up to 2 racks

G650 [x 8U]

13 PNs = 104U of rack space, up to 3 racks

RSW

single HP DL360 Gen 9 Server = 1U
IMPACTING TOTAL COST OF OWNERSHIP (TCO)

- Gartner “The cost to own and run a data center is significantly higher than many IT managers realize.” [1]
- Contributors to lower footprint, labor, and overall energy costs (AAMS compared to G450)
  - Higher channel densities: 4000 channels vs. 320 channels
  - Reduced rack height consumed:
    - 1U per AAMS server vs. 3U per G450 vs. 8U per G650
  - = potential less racks, less servers
  - = potential 2.5X reduction in operating/footprint costs

[1] “Use a TCO Model to Estimate the Costs of Your Data Center” Gartner G00233221 (26 June 2012)
CO-LOCATION DATA CENTER OPERATING COSTS EXAMPLE

- Example contributors to operating costs:
  - Right to Use fees: $1750/rack/month (w/ 10kW load capacity)
  - Facility Power Usage Effect (PUE): 1.5X
  - Contract Power Cost: $0.05/kwH
  - Network charges (highly variable): $75/server/month

- Resulting AAMS cost to support ~ 4000 channels is 2.5X lower than G450:
  - G450
    - 13 G450s in 2 racks
    - $4639/month
    - ~ $155k over 3 years (PV, 5% IRR) <- operating cost
  - AAMS
    - 1 AAMS in 1 rack (conservative assumption that entire 42U rack is utilized by single server)
    - $1849/month
    - ~ $62k over 3 years (PV, 5% IRR) <- operating cost
SUPPORTING MULTIPLE CM INSTANCES

- Media Gateways and Port Networks
  - Each MG or PN can must be assigned to a single CM instance.
  - A network with two CM instances must at minimum have two MGs (or two PNs)

- AAMS
  - Each AAMS instance can provide media resources to multiple CM instances.
  - A network with two CM instances could be served by a single AAMS instance.
  - CM instances can be served by a pool of AAMS instances.
Virtualization (AVP or VE)

- Virtualization allows for multiple Avaya applications to co-reside on the same AVP or VE server.
- AAMS on OVA can be deployed in environments were virtualization is desired, such as:
  - Customer data centers utilizing virtualization
  - Survivable remote server locations
  - Branch offices

Example of a branch office: Flexible deployment of applications on single server

Branch office solution: with Media Server – no gateway required
MULTINATIONAL DEPLOYMENTS: MULTI-COUNTRY TONE SUPPORT VIA SINGLE AAMS

- If a customer’s CM serves multiple countries, each country’s specific tone generation requirements requires dedicated G450s.

- AAMS and CM 7.0.1 (GA planned May 2016): 1 AAMS instance satisfies all countries’ tone requirements simultaneously. Thus, a single AAMS instance can replace the multiple MGs deployed to support each country.

- **Example:** A customer requires 1000 channels of media/DSP capacity, supporting unique tone generation sets of 10 countries.
  
  - **Media Gateways**
    - To support 1000 channels in a single country, need 4 MGs.
    - To support the 10 countries, need at least 10 MGs, potentially up to 40 MGs.
  
  - **AAMS** – 1000 channels supporting 10 countries handled by 1 AAMS.
ANNOUNCEMENT PLAYBACK CHANNELS

- A single G450 only provides 63 simultaneous announcement playback channels.
- For AAMS, every licensed media channel can play an announcement.
- **Example**: Customer wishes to be able to simultaneously play 250 announcements.
  - G450: 4 **MGs** required
  - AAMS: 1 **AAMS** instance required
ANNOUNCEMENT RECORDING TIME

- CM has a 1024 announcement count limit per AAMS, MG, or PN instance.
- Each G450 has a 4 hour total announcement limit.
- AAMS announcement duration is only limited by the size of the HDD storing the announcements.
  - Example: 2000 hours of recorded G.711 requires 57.6 GB HDD. On Avaya-provided non-virtualized servers, we have ~ 250 GB free in Raid 1.
- Announcements that may need to be spread across multiple MGs to get enough total announcement time may be stored on far fewer AAMS servers.
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CUSTOMER EXAMPLE: FUTURE STATE
CUSTOMER EXAMPLE – THE NUMBERS

Current (MG,PN) State Configuration
- DC1: 11 racks, 40 G650s, 6400 DSP capacity (half the G650s in all DCs are active)
- DC2: 3 racks, 12 G650s, 1920 DSP capacity
- DC3: 5 racks, 20 G650s, 3200 DSP capacity
- DC4: 4 racks, 8 G650s, 16 G450s, 6400 DSP capacity
  - Total Annual Operating Costs = $598k per year
  - TCO (PV, 3 year life, 5% IRR) = $2.4M

Future (AAMS) State Configuration
- DC1: 1 rack, 4 AAMS, 6400 licensed channels (8000 channel capacity)
- DC2: 1 rack, 2 AAMS, 1920 licensed channels (4000 channel capacity)
- DC3: 1 rack, 2 AAMS, 3200 licensed channels (4000 channel capacity)
- DC4: 1 rack, 4 AAMS, 6400 licensed channels (8000 channel capacity)
  - Annual Operating Costs = $98k per year
  - TCO (PV, 3 year life, 5% IRR) = $1M

- AAMS savings: $500k annual operating costs, $1.4M TCO (PV, 3yr, 5%IRR)
FOOD FOR THOUGHT: WHEN WOULD YOUR CUSTOMER WANT TO ADOPT AAMS?

- All MGs and PNs are full at a customer site. Additional DSP/media resources needed.

- Customer is utilizing many port networks or gateways solely to handle playback of many announcements. Rather than being subject to the playback limits of PNs and MGs, use AAMS instead.

- Customer has many gateways w/ legacy interfaces and DSP resources. Consolidate legacy trunking onto a reduced number of gateways, and have AAMS handle the DSP/media requirements.
THANK YOU! FOR MORE INFORMATION

- “Use a TCO Model to Estimate the Costs of Your Data Center” [Gartner G00233221 (26 June 2012)]
- Product Management – AAMS adoption by Communication Manager
  - Sampson Wu (wu101@avaya.com)
  - Lisa Marinelli (lmarinelli@avaya.com)
<table>
<thead>
<tr>
<th>Monday, April 4</th>
<th>Tuesday, April 5</th>
<th>Wednesday, April 6</th>
<th>Thursday, April 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30pm - 9:00pm</td>
<td>7:00am - 8:30am</td>
<td>7:00am - 8:30am</td>
<td>7:00am - 8:30am</td>
</tr>
<tr>
<td>12:15pm - 1:30pm</td>
<td>12:15pm - 1:30pm</td>
<td>6:00pm - 8:00pm</td>
<td>(Expo closes after breakfast)</td>
</tr>
</tbody>
</table>

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