Lync 2010 and the SBA

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1 Intro to Lync 2010

Microsoft originally released what is now known as Lync in December of 2003 under the name Live Communications Server (LCS). It was primarily an enterprise presence/IM engine with limited voice services. LCS was upgraded with subsequent releases and service packs. In July of 2007, a new version came with a new name of Office Communications Server (OCS) providing general improvements and its capabilities expanded into web conferencing with basic voice and video services. In December 2008, OCS R2 introduced improved stability, dial-in conferencing, and additional voice features. OCS R2 gained traction and a fan base, but still had significant restrictions that limited its appeal as an enterprise voice solution. Lync Server, released in November of 2010, represented a major upgrade, the product portfolio is now positioned as a comprehensive unified communications solution.

What sets Lync apart is how it integrates its tools together and with other Microsoft solutions. The user experience centers around the Lync 2010 client which offers four intuitive tabs; Contacts, Conversations, Activity Feeds, and Phone. Each tab provides presence and communications information with different perspectives. The Lync 2010 solution offers numerous significant upgrades to OCS R2. Potentially the biggest being the design and architectural improvement for branch office connectivity via the new Survivable Branch Appliance (SBA). That is the primary focus of this document, however, other major improvements in the Lync 2010 solution include:
• **Location awareness and E911:** Lync 2010 introduces the notion of location information combined with presence enabling E911.

• **Contact Cards:** A live contact card that gathers information from several sources revealing contact information on colleagues. The information that is visible is determined by Active Directory security policies. The card is available throughout the Microsoft Office applications.

• **Management Reports:** Manageability and operational improvements are found throughout the product.

• **TCO:** Several improvements that bring down the total cost of ownership.

• **HA:** Server reductions and architectural improvements enabling high availability deployments.

• **New endpoints:** Polycom and Aastra launched new phones specifically designed for Lync deployments. Snom also obtained “qualification” for some of its phones.

• **Virtualization:** All of the Lync Server roles can now be virtualized in as few as one server.

• **Voice Features:** Lync is positioned as a comprehensive Unified Communications solution, including the ability to replace a PBX. This required narrowing the gap between the voice capabilities found in OCS and the features expected on a phone system.

• **Speech capabilities:** Exchange 2010 now offers text to speech options including voice mail transcription in Exchange.

The upgrades in Lync 2010 are vast and widespread ranging from critical functionality enhancements to aesthetics. Microsoft focused on the user experience centered around the Lync 2010 client. The strength of Lync lies in how various forms of real-time communication are consolidated. The notion of a conversation applies to IM, voice, and video - and a conversation can dynamically change modes.

Microsoft positions Lync as a comprehensive solution for unified communications. It can be an alternative to separate telephony solutions and offers many benefits when implemented in such a comprehensive fashion. However, Lync 2010 can also be implemented without voice support or be integrated with a separate telephony solution; numerous phone systems are supported. The organization has a choice regarding telephony. Technically, this was also true with OCS R2, however issues around cost, complexity, and resilience made enterprise-wide telephony via OCS R2 daunting.

### 1.1 Centralized Voice Administration

The traditional approach for branch office telephony dedicated local phone systems at each location. This has been the norm for decades, largely because there were no viable alternatives. The local phone system was interconnected to other offices via tie-lines and/or the PSTN. The branch solution was generally independent with slave/master configurations being the exception rather than the norm. Several factors have aligned against this model.

• **Cost:** Independent branch office phone systems are not trivial purchases. Phone systems are expensive to purchase, maintain, and administer.

• **Management:** Often as a result of acquisitions, enterprise customers collect multiple brands and versions of branch phone systems which makes centralized management difficult.

• **Capacity:** In order to accommodate peak demand loads, each system requires circuit sizing for its maximum demands. This adds up. A centralized approach, for example, typically sees a significant reduction in circuits as demand peaks move across time-zones. Additionally, the overall capacity at the centralized location allows a branch (or any site) to tap into significantly greater capacity should an unusual demand arise.
Meanwhile technology changes aligned in favor of centralized communications:

- Voice migrated to VoIP which is far less sensitive to geographic distance. SIP carriers offer circuits and “local” numbers nationally and often internationally.
- VoIP systems also eliminate the need for specialized wiring to both desktops and carriers.
- IP connections to branch offices continue to grow and drop in price. Rather than keep voice and data on separate links, a single larger IP connection can support voice, E-mail, CRM, ERP, V-Mail, and other enterprise data requirements.
- Voice Mail systems are often centralized and tightly coupled with email systems which are commonly centralized.
- Cost pressures in a weak economy have reduced staff and put more pressure on budgets; particularly human costs.

Only one significant barrier to centralization of voice remained in place; reliability. Local POTS lines into a local phone system are inherently more reliable than VoIP over a wide-area network. Many PBX makers address this with local on-site phone systems that integrate with the main office systems and use local PSTN lines for failover when necessary. Lync 2010 introduced a similar, but refined concept known as the Survivable Branch Appliance (SBA). The solution enabled a centralized approach, yet offers local survivability via local services as well as local PSTN access.

### 1.2 The Survivable Branch Appliance (SBA)

The SBA is a purpose-built appliance optimized to provide resilient local multi modal communication, and for maximizing branch office user productivity. This is a hardware device produced by (initially) five hardware partners under Microsoft’s UC partnership program. Each model runs a version of Lync Server 2010 optimized for a branch office function. The SBA has several important design considerations:

- Minimal administrative/setup requirements at the branch office
- Minimal ongoing additional administrative duties
- The ability to provide limited services to the branch office in case of failure
- Elimination of a single point of connectivity failure for the branch office.

In order to make the SBA work, Microsoft needed to re-architect portions of the connectivity implemented in OCS R2. These architectural changes, combined with the design considerations above make the SBA a fairly attractive solution on three fronts: administrative, user, and financial.

The SBA administratively is in effect a slave to the data center. It adds negligible administrative and management overhead while extending the data center’s visibility and control over the branch office. The users will find the SBA is a transparent device – the branch office users will receive the same Lync services and features found at major sites; no longer considered second class citizens. Financially, it offers an organization the ability to reduce the number of voice platforms and associated costs without a hit to reliability, while concurrently improving enterprise-wide feature consistency.
Lync 2010 and the SBA

Lync 2010 is designed for a Microsoft environment. It makes the most sense when the predominance of users are already using (or intend to be using) a business edition of Windows, Active Directory security, Exchange for messaging, Microsoft Office, and optionally SharePoint.

Additional tools such as a web interface and a planned Macintosh client give Lync broader appeal and access, but its spirit lies within a Microsoft heavy infrastructure. Lync 2010 is also geared toward larger enterprises. There is no hard cutoff, but the implementation and management requires a fair degree of Microsoft server expertise which isn’t commonly found at smaller organizations. As a general rule of thumb, organizations with more than 250 employees are suitable candidates for Lync.

Lync Server 2010 has four distinct server roles. This represents a consolidation and improvement over OCS R2. Server roles are not the same thing as servers- there are specific guidelines for the number of servers which consider several factors including the number of users and the number of simultaneous conferences. The server roles are: Front-end, Back-end, AV Conferencing, and Edge. Additionally, the solution interfaces with Microsoft Exchange for Unified Messaging and Microsoft System Center for monitoring.

The server roles can be set-up with Standard Edition or Enterprise Edition Windows servers. Enterprise edition offers a higher level of resilience by allowing some resources to be pooled at one or more datacenters.

To provide communications resiliency for branch offices, Microsoft Lync Server 2010 introduces the Survivable Branch Appliance role and the Survivable Branch Server role. The Survivable Branch Server is a standard Windows Server 2008 R2 Server with the relevant installed components. The Survivable Branch Appliance is a physical appliance. The Survivable Branch Appliance and Survivable Branch Server are targeted for branch office scenarios to provide high availability to the majority of Lync Server services (particularly Enterprise Voice) in the face of network connectivity failures in the primary site where Lync Server is deployed.
For branch offices, administrators have a choice between no servers, gateway only, an SBA, or full Windows server(s). For very small locations (less than 25 users), it probably makes sense to go with no local resources or a gateway only. In the case of a failure, users may be able to maintain productivity with cell phones and/or Internet from a local coffee shop or home office. The sweet spot for the SBA is 25-1000 users, but that isn’t a hard set rule, consideration needs to be given to how important inter-office connectivity is and its cost. Full blown local servers instead of an SBA can make sense in some branch offices, particularly in remote locations with costly WAN links. Additionally, Multiple SBAs could be deployed in one location.

The SBA is expected to win in a wide variety of situations. It is a specifically designed and optimized for voice and broader UC capabilities. Each SBA contains the following components: Windows Server 08 R2 optimized for the Mediation Server role, a Lync 2010 Registrar, and a PSTN gateway. The SBA is functionally designed for the following tasks: SIP Registrar (normal/failover), SIP Proxy and routing engine, and PSTN and voice mail routing/rerouting.

2.1 SBA Deployment
The SBA solution is optimized for simple deployment and ongoing administration. The solution requires minimal technical expertise at the remote branch office. An SBA can be deployed by following this process:

At the central site set up active directory for the SBA:

1. Create a domain user account (or enterprise identity) for the technician who will install and activate the Survivable Branch Appliance at the branch site.
2. Create a computer account (with the applicable FQDN) for Survivable Branch Appliance in Active Directory.
3. In Topology Builder, create and publish the Survivable Branch Appliance.

At the branch site install and activate the SBA:

4. Connect the Survivable Branch Appliance to an Ethernet port and PSTN port.
5. Start the Survivable Branch Appliance.
6. Join the Survivable Branch Appliance to the domain, using the domain user account created for the Survivable Branch Appliance at the central site. Set the FQDN and IP address to match the FQDN created in the computer account.
7. Configure the Survivable Branch Appliance using the OEM user interface.
8. Test PSTN connectivity.

The remote site requires minimal technical skills, effectively unpack the box, and plug it in.

2.2 MSFT Roles and Requirements for SBA

2.2.1 What Survives During an Outage
The Lync/SBA architecture optimizes availability and provides services should either the WAN or even the SBA itself fail. In its normal operation, each branch user registers with the SBA upon login, this includes users physically in the branch and remote users that are homed to the branch as well. Remote users come through the WAN Edge to access and register with the SBA.
Should the WAN fail, nothing changes for the branch users. This is why the SBA runs the registrar. The respiration process is in fact identical to its normal operation. Effectively this means the SBA’s failover mode is normal operation which mitigates the risk or exposure of the resilient system not being seamlessly ready/in-sync during failover conditions. External users in a WAN down scenario now register with the designated backup registrar typically a pool of servers at the data center. If the SBA itself fails, then all users are now directed to the backup registrar typically at the data center.

Features Available to Branch Office with SBA WAN Fails:

- PSTN Inbound and Outbound calls
- Intra-Site calls, Inter site calls (PSTN Rerouting)
- Voicemail Retrieve (through PSTN)
- Hold, Retrieve, Transfer
- Audio Conferencing through PSTN
- Authentication, Authorization
- All two party intra site communications
- Call Forwarding, Simultaneous Ring, Boss-Admin, Team-call
- Call Detail Records (CDR)
- Voicemail Deposit (Redirect to ExUM in Data Center)

2.2.2 What Fails During an Outage

During failure conditions, the SBA provides limited or reduced functionality. Some services are no longer available.

Features Unavailable to Branch Office should WAN Fail

- Inter-site data real time communications (IM, App Sharing, etc.)
- Modify Presence or Change Call Forwarding Settings
- Conferencing (IM, Video and Web)
- Contact List
- Response Group and Call Park
- Presence & DND based routing

3 SBA Makers

This section offers a snapshot of the different SBA makers.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>NET</th>
<th>AudioCodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/Model</td>
<td>UX2000</td>
<td>Mediant 1000</td>
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<tr>
<td>Hardware</td>
<td>Intel Core i7 2.53 Ghz 4GB ECC</td>
<td>Intel Core2 L7400 wotj Omte; 3100 chipset (64 bit), 2/4 GB DDR2 w/ ECC</td>
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<td>Active Directory Caching</td>
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<td>Yes</td>
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<tr>
<td>Interfaces</td>
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<td>Dual 1GB eth, USB, RS232,</td>
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<td>Size</td>
<td>1U/19&quot;</td>
<td>1U/19&quot;</td>
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<tr>
<td>--------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Transcoding</td>
<td>Up to 600 sessions</td>
<td>Up to 60 sessions</td>
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<tr>
<td>Call Forking</td>
<td>up to 8 destinations</td>
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<td>Codecs</td>
<td>G711, G726, G723, G729</td>
<td>G711, G726, G723, G729A, GSM-FR, MS-GSM, RTA</td>
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<td>Digital Interfaces</td>
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<tr>
<td>BRI</td>
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<tr>
<td>PRI/T1/E1</td>
<td>8</td>
<td>Up to 4 (16 on 2000)</td>
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<td>Analog Ports</td>
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<td>24</td>
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<td>Monitoring/Diagnostic</td>
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<td>SCOM, AEMS, HTTP, Telnet, SNMPv2-3</td>
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<td>Israel and China</td>
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<td>Encryption</td>
<td>TLS, SRTP, HTTPS, SSL</td>
<td>IPSEC, HTTPS, TLS, SSL, SRTP, RADIUS</td>
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</table>

Table of Gateways Part 1

### 3.1 AudioCodes

AudioCodes implements the SBA with Lync Server 2010 on its Mediant 1000 and 2000 gateways with the “basic Hybrid R2” image via a software only upgrade. The upgrade creates the AudioCodes Mediant Survivable Branch Appliance and it can be managed by Microsoft’s SCOM. The software upgrade approach leverages an existing base of AudioCodes’ Intel based gateways.

These gateways support SIP and TDM interfaces (PRI/CAS/E1/J1/BRI) and/or analog ports in various FXO/FXS configurations, as well as native support for multiple PBX systems.

Both the 1000 and 2000 Mediant Gateways support very large branch sizes. The Mediant 1000 SBA can be configured to support 120 concurrent calls and 1000 registered users and the Mediant 2000 SBA can scale to 240 concurrent calls and 1,000 registered users. Microsoft publishes guidelines on SRTP restrictions and RAM requirements. Both units are stackable as well. The use of the AMC based server module allows for simple field upgrade to higher performance servers in the future.

- Field upgradeable gateway hardware to SBA configurations.
- Utilizes AudioCodes VoIPerfect Technology for voice quality management.
- Scalable, modular approach.
- Extensive list of EMC and PSTN country homologation
- Extensive interoperability tested with PBX and business telephony systems
- Managed by SCOM
- Optional integrated 4 Port GB LAN switch
- Monitoring and diagnostics via EMS, Syslog, and RADIUS
- Strong value, low price, and reasonable feature set
- AudioCodes makes two SBA’s the Mediant 1000 and 2000. There are numerous differences other than capacities.
The UX2000 by NET is a power horse. It was designed to be an SBA rather than adapted from an existing product, and includes a border controller. It comes equipped with up to six DSPs, and two telecom card slots provide a choice of 2, 4, or 8 port DS1 cards. The UX2000 also has a slot for an Applications Solutions Module (ASM) for third party applications. The UX2000 can actually support up to 600 simultaneous transcoded encrypted conversation paths.

The NET UX2000 features a 24 Gbps IP-core backplane capable of routing more than 35 million packets per second. The unit supports T1/E1, WAN and LAN ports, Session Border Controller (SBC), and a PSTN gateway. By supporting a variety of protocols, advanced security, and CODEC transcoding, the UX2000 enables a distributed enterprise to cost-effectively implement unified communications across the enterprise.

NET’s UX2000 is a bit overkill for smaller offices so the company intends to soon release the downscaled UX1000.

- Maximum 2 T1/E1 digital voice
- 8 BRI digital voice
- Up to 24 FXx
- T1 WANs/G.HDSL/ADSL2+/WWAN
- Wi-Fi Access Point
- Low power Intel CPU to support 3rd party apps, including MSFT SBA
- Default features:
  - Switched Ethernet ports with POE
  - Dynamic IP routing
  - Transcoding
  - Security with SBC/VPN and firewall

Key observations:
- Lots of power, suitable for large offices
- Single web interface for SBA and gateway
- Best in class audio quality – by Miercom

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>HP</th>
<th>Dialogic</th>
<th>FERRARI</th>
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<tbody>
<tr>
<td>Name/Model</td>
<td>zl Module</td>
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<td>OfficeMaster SBA</td>
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<td>HP ProLiant</td>
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<td>Interfaces</td>
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<td>Dual Eth GB, USB 2</td>
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<tr>
<td>Size</td>
<td>2 slot high card fits in HP E5412 zl, E5406 zl, E8212 zl chassis</td>
<td>1U/19&quot;</td>
<td>1U/19&quot;</td>
</tr>
<tr>
<td>Call Forking</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Codecs</td>
<td>Not Available</td>
<td>Not Available</td>
<td>G711, G726, G729,</td>
</tr>
</tbody>
</table>
### 3.3 HP

HP has designed a module that fits into the chassis of the Procurve E8200 and E5400 Switches. It’s a clever approach for users with an investment in these HP ProCurve switches as the module eliminates the need for separate additional hardware. This product is only suitable in environments with technical knowledge of the HP ProCurve family of products with HP’s Adaptive Edge Architecture. UP ProcCurve Accredited Integrated Specialist Certification is recommended.

- Field Upgradeable gateway hardware to SBA configurations.
- Strong solution for end to end QoS policies. Microsoft uses Differentiated Services Code Point (DSCP) values for voice and video.
- Manage WAN link SLAs to the service provider.
- Supports IPsec tunneling.
- AAA security features.

### 3.4 Dialogic

The DMG4000 Gateways are standard rack-mount servers running the Windows Server 2008 R2 operating system. They support the Survivable Branch Appliance function. Dialogic positions their DMG4000 Gateway as a SBA with Lync Server 2010. The DMG4000 is already used around the world, but requires a software upgrade to enable the SBA functionality. This is a software-only field upgrade. The DMG4000 Gateway subsystem connects traditional TDM voice systems and PSTN services with Microsoft’s Lync Server 2010. The gateways have analog, FXO, BRI, or T1/E1 interfaces (single, dual, or quad density).

- Kontron Server
- Diva signaling/media cards
- Field upgradeable to SBA
3.5 Ferrari

Ferrari brands its SBA under the OfficeMaster brand and it is based on an HP Proliant server running Microsoft Windows Server 2008 R2 and Lync Server 2010. A PCI express card contains the complete media gateway which supports different types of ISDN connections; four BRI up to 48 channel of E1/T1/PRI. A separate low profile PCIe card supports 4 analog FXS ports. SIP support is planned as an option. The Proliant can support RAID and redundant power.

4 Additional Roles the SBA can perform

Microsoft specifies minimum requirements for the SBA in terms of how it interacts with Lync, but it is up to the hardware partner to determine if additional features are added to the appliance. Here are some examples of optional features available in some SBAs.

- True Appliance:
  - Firewalled off the network
  - Managed like an appliance, upgrades installed via the browser
- Support for DECT, Wi-Fi, analog, and SIP phones.
- Least Cost Routing
- Session Border Controller
- Firewall
- Broader SIP Support (end-points and carriers)
- SNMP support
- IPsec tunneling (not recommended for media stream)
- Fax: T.30 Fax group or T.38 FoIP.

4.1 Additional SBA Features and Considerations

Microsoft ensures that each SBA from its partners meets its minimum standards, but that does not suggest all SBAs are equal. Not only do SBAs come in different prices, speeds, and configurations, but significant feature set differences exist as well. Below are major considerations in selecting an SBA.

Call Forking: All of the SBAs support downstream or Lync managed call forking which allows a gateway to forward a call to be sent to multiple destinations. However, some units have call forking built into the gateway itself. This enables non Lync endpoints (including a PBX) to be included (that are supported by the gateway) and reduces the number of call paths over the WAN (Lync based call forking requires a separate call path over the WAN for each forked call).

Active Directory Integration: This feature allows local storage of user location information. This is particularly relevant with migration projects involving Lync and legacy solution(s). Local storage of custom AD supported call flows increase routing options and prevents calls from being lost in case of WAN failure.

Transcoding: Transcoding is necessary when multiple CODECs are involved in a single call path. A gateway with local transcoding capabilities increases the number of codecs supported over those supported by Lync. For example, Lync does not support G.729 which is often preferred with international WAN links. A gateway that can transcode G.711:G.729 may realize significant network savings.
Management Interface: The majority of administration of an SBA is performed through Lync, but direct access to the gateway is also necessary, particularly associated with advanced (or non Lync) features. Most systems use a browser based management solution, however, the capabilities and level of integration varies. There is some risk for data mismatch between Lync and the gateway, which is reduced when there is a tightly integrated web console.

SIP Survivability: This feature preserves a SIP call path should the connection to the primary SIP server fail. Some SBAs can reroute an active SIP session should the Lync Server connection fail.

4.2 Additional Information

For more details, including specific supported models and configurations, please visit the Microsoft Unified Communications Open Interoperability Program (UCOIP) website at http://technet.microsoft.com/UCOIP.