

# Microsoft® Lync® Server 2010 on Dell™ Systems



**Solutions for 500  
to 25,000 Users**

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# 1 Introduction

## 1.1 Overview

This Microsoft® Lync Server 2010 solution architecture manual contains possible configurations that can be used to architect your Lync 2010 infrastructure. Samples in the manual are intended to serve as a blueprint or example for organizations whose requirements are similar. Each organization's requirements can differ significantly, though, and include items not accounted for in these configurations. For a configuration sized to your specific requirements, please contact your Dell representative or visit [Dell.com/Unified](http://Dell.com/Unified).

## 1.2 Hardware

Sample solutions described in this manual use the following Dell equipment:

- [PowerEdge™ R320](#)
- [PowerEdge™ R420](#)
- [PowerEdge™ R620](#)
- [PowerEdge™ M620](#)
- [PowerEdge™ R720](#)
- [PowerEdge™ M1000e](#)
- [Force10™ S55](#)
- [Force10™ S60](#)
- [PowerConnect™ M6348](#)
- [PowerConnect™ 6248](#)
- [Equallogic™ PS4100XV](#)
- [Equallogic™ PS6100XV](#)

Click on the links to the product landing pages for additional information on each product.

## 1.3 Virtualization

Those configurations that employ hardware virtualization software assume a platform approved through Microsoft's [Server Virtualization Validation Program](#) and deployed consistent with Microsoft's support guidelines for running Microsoft Lync Server 2010 on a virtualization platform. In the lab, the virtualization platform used was Hyper-V.

## 1.4 Disclaimer

These sizing recommendations are based on sizing results obtained from Microsoft's [Stress and Performance Tool](#) for Lync 2010. Each deployment's workload may differ in specific requirements that govern sizing and architecture. The reference architectures present a suggested distribution of virtual machines on physical servers and other combinations of distribution are possible. The configurations provided in this document provide server and storage sizing guidance and do not provide recommendations for client-side devices.

## 2 500 Users

### 2.1 Overview

This reference architecture is for small Lync deployments and can support Instant Messaging, Presence, and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. The R620 can be replaced by T620 or R720 and the R320 by T320 with equivalent CPU and memory configuration, should tower servers be required. This solution's server, storage or networking design is not highly-available.

### 2.2 Solution Requirements

|                               |   |
|-------------------------------|---|
| Number of users               | 500   |
| High Availability             | No  |
| Virtualization                | Yes   |
| Number of Sites               | 1   |
| Not included in this solution | Exchange 2010 for Email and Unified Messaging<br>Reverse Proxy (assumed already present in Perimeter Network) |

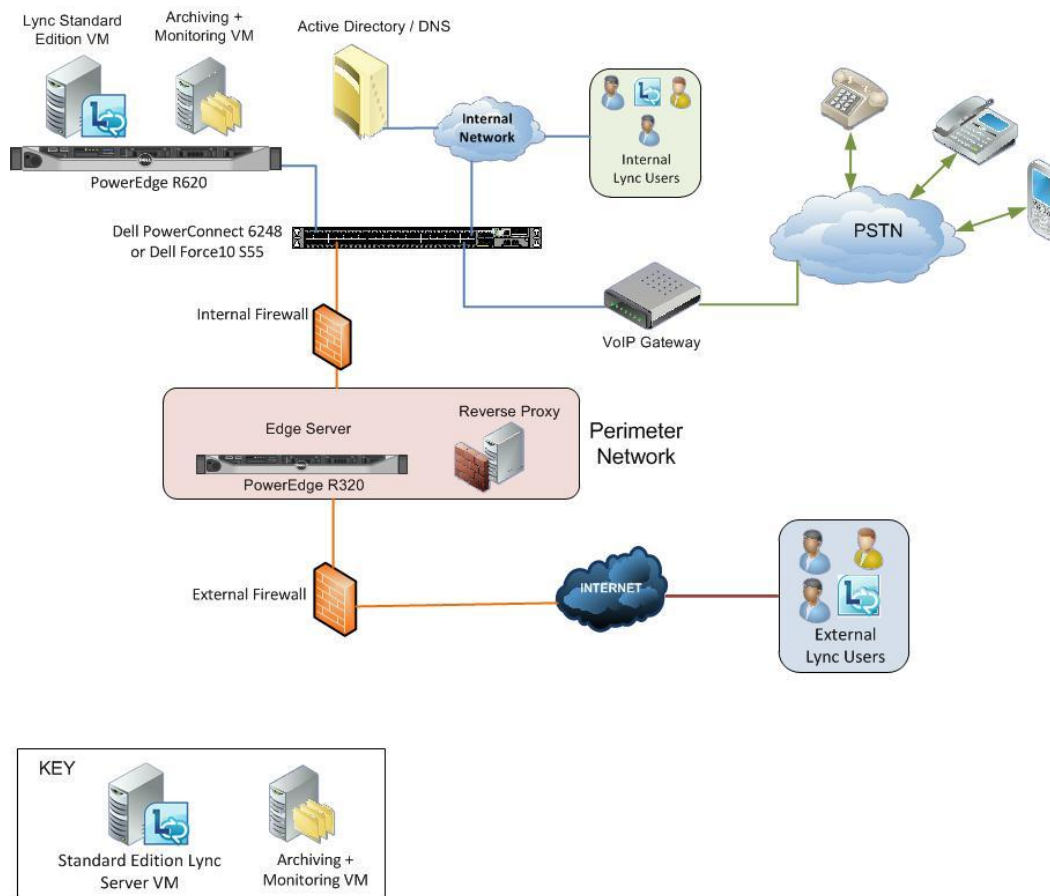
### 2.3 Recommended Solution

| Server Configurations                    | Detail  |
|--|---|
| Microsoft Lync Server Version            | Standard Edition  |
| Physical Server Configuration            | 1 x PowerEdge R620<br>2 x 6-core Intel Xeon<br>24 GB Memory<br>8 x 600GB 2.5" 10k SAS           |
| Standard Edition Lync Server             | 1 x Windows Server 2008 R2 VM<br>4 vCPUs<br>8 GB Memory   |
| Archiving/Monitoring Server <sup>1</sup> | 1 x Windows Server 2008 R2 VM<br>4 vCPUs<br>8 GB Memory   |
| Edge Server                              | 1 x PowerEdge R320<br>1 x 4-core Intel Xeon<br>4 x 2 GB = 8 GB Memory<br>2 x 146GB 2.5" 15k SAS |
| Storage Configuration                    | Detail  |

<sup>1</sup> Reduced memory for smaller configuration

|   |  |
|---|--|
| Storage for Archiving+Monitoring <sup>2</sup> | Internal Storage<br>6 x 600GB 2.5" 10k SAS in RAID 10 <sup>3</sup> |
| RAID Controller                               | 1 x PERC H710P   |
| Network Configuration <sup>4</sup>            | Detail   |
| LAN Networking                                | 1 x Dell PowerConnect 6248 or<br>1 x Dell Force10 S55 Switch       |
| VoIP Connectivity <sup>5</sup>                | PSTN Gateway or SIP Trunking                                       |

## 2.4 Architecture Diagram



<sup>2</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

<sup>3</sup> Plus 2 x 600GB 2.5" 10k SAS used for OS and VMs in RAID 1

<sup>4</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>5</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation

## 3 1,000 Users

### 3.1 Overview

This reference architecture is for small Lync deployments and can support Instant Messaging, Presence, and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. The R620 can be replaced by T620 or R720 and the R320 by T320 with equivalent CPU and memory configuration, should Tower Servers be required. This solution's server, storage or networking design is highly-available. The reverse proxy is assumed to be present in the customer environment.

### Solution Requirements

|                               |  |
|-------------------------------|--|
| Number of users               | 1,000  |
| High Availability             | Yes <sup>6</sup>                                 |
| Virtualization                | Yes <sup>7</sup>                                 |
| Number of Sites               | 1  |
| Not included in this solution | Exchange servers (including UM)<br>Reverse Proxy |

### 3.2 Recommended Solution

| Server Configurations  | Detail  |
|--|---|
| Microsoft Lync Server Version  | Enterprise Edition  |
| Physical Server Configuration <sup>8</sup>                           | 2 x PowerEdge R620<br>2 x 6-core Intel Xeon<br>64 GB Memory<br>2 x 300GB 2.5" 15k SAS |
| Front End, Mediation and A/V Conferencing VMs (Collocated) in a pool | 2 x Windows Server 2008 R2 VMs<br>1 VM per Host<br>4 vCPUs<br>16 GB Memory            |
| Archiving+Monitoring VM <sup>9</sup>                                 | 1 x Windows Server 2008 R2 VM<br>4 vCPUs<br>20 GB Memory                              |

<sup>6</sup> Designed to tolerate failure of any one physical machine

<sup>7</sup> Excludes Back End SQL Server

<sup>8</sup> HyperV failover clustering should be configured

<sup>9</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

|   |   |
|---|---|
| <b>Back End Servers (using SQL Server fail-over clustering)</b> | 2 x PowerEdge R620<br>2 x 4-core Intel Xeon<br>16 GB Memory<br>2 x 146GB 2.5" 15k SAS |
| <b>Edge Servers<sup>10</sup></b>                                | 2 x PowerEdge R320<br>1 x 4-core Intel Xeon<br>8 GB Memory<br>2 x 146GB 2.5" 15k SAS  |
| <b>Storage Configuration</b>                                    | <b>Detail</b>   |
| <b>Storage for VMs, Back-End and Archiving/Monitoring</b>       | Dell Equallogic PS 4100XV<br>24 x 146GB 2.5" 15k SAS in RAID 10                       |
| <b>Network Configuration<sup>11</sup></b>                       | <b>Detail</b>   |
| <b>LAN Networking</b>   | 2 x Dell PowerConnect 6248 or<br>2 x Dell Force10 S55 Switches                        |
| <b>SAN Networking</b>   | 2 x Dell PowerConnect 6248 or<br>2 x Dell Force10 S60 Switches                        |
| <b>Additional Hardware</b>                                      | 4 x Quad Port Network Interface Cards <sup>12</sup>                                   |
| <b>VoIP Connectivity<sup>13</sup></b>                           | <b>PSTN Gateway or SIP Trunk</b>  |

<sup>10</sup> Edge pool to be configured with DNS Load Balancing

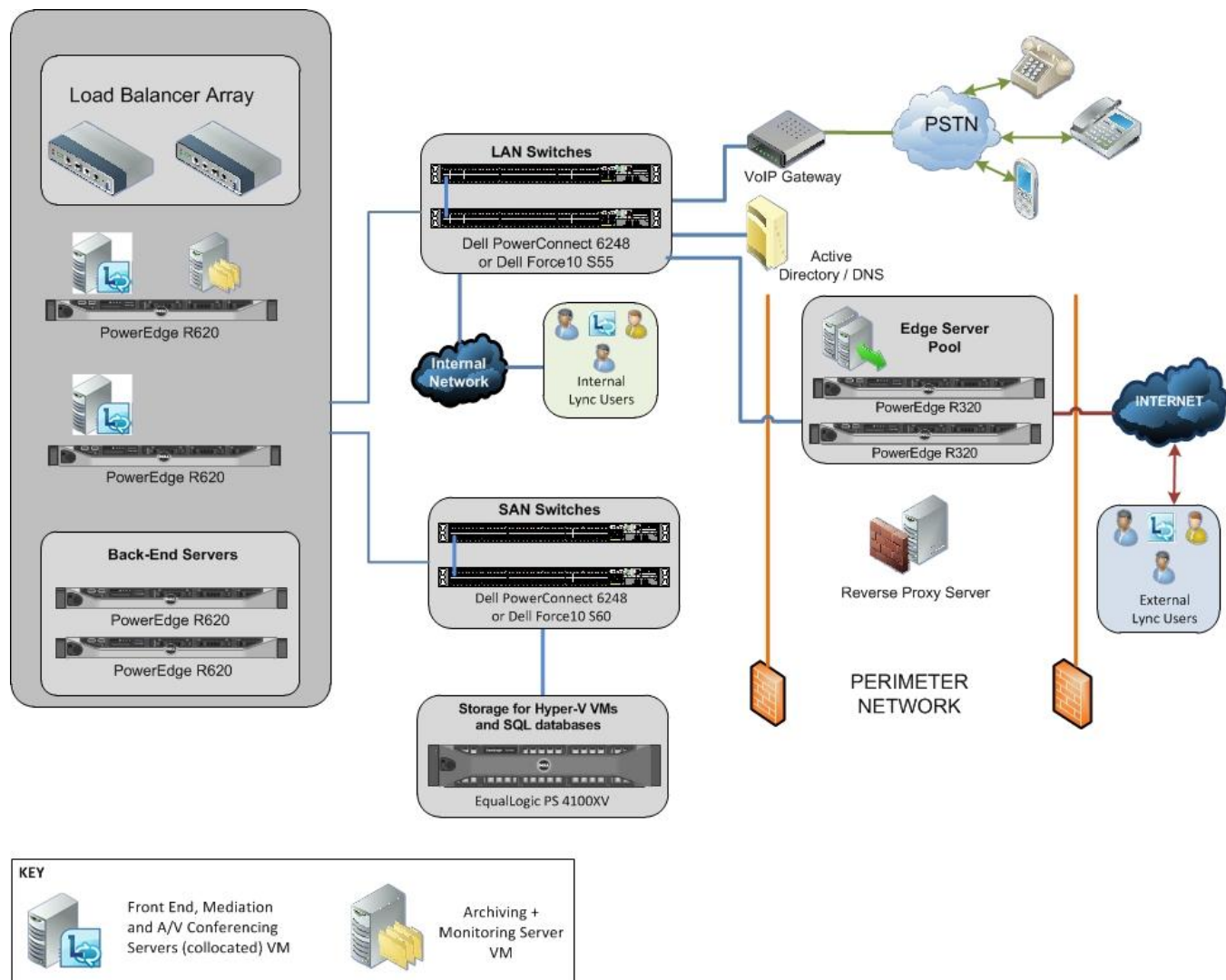
<sup>11</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>12</sup> Connectivity to Equallogic iSCSI SAN for 2 x Back-End, 2 x Front-End/Archiving+Monitoring Hosts

<sup>13</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation



### 3.3 Architecture Diagram



## 4 5,000 Users

### 4.1 Overview

This reference architecture is for small/mid-size Lync deployments and can support Instant Messaging, Presence, and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. The R620 can be replaced by T620 or R720 and the R320 by T320 with equivalent CPU and memory configuration, should Tower Servers be required. This solution's server, storage or networking design is highly-available and it is recommended that both controllers be used for the PS6100XV storage array. This Edge Server user model leverages the Microsoft recommendation of 4 cores per 7500 users. A reverse proxy is assumed to be present in the customer environment.

### 4.2 Solution Requirements

|                               |  |
|-------------------------------|--|
| Number of users               | 5,000 (70% Internal and 30% External)            |
| High Availability             | Yes <sup>14</sup>                                |
| Virtualization                | Partially virtualized                            |
| Number of Sites               | 2  |
| Not included in this solution | Exchange servers (including UM)<br>Reverse Proxy |

### 4.3 Recommended Solution

| Server Configurations  | Detail  |
|--|---|
| Microsoft Lync Server Version  | Enterprise Edition  |
| Physical Server Configuration <sup>15</sup>                          | 2 x PowerEdge R620<br>2 x 8-core Intel Xeon<br>72 GB Memory<br>2 x 300GB 2.5" 15k SAS                                     |
| Front End, Mediation and A/V Conferencing VMs (Collocated) in a pool | 3 x Windows Server 2008 R2 VMs<br>1 VM on 1 <sup>st</sup> Host. 2 VMs on 2 <sup>nd</sup> Host.<br>4 vCPUs<br>16 GB Memory |
| Archiving+Monitoring VM <sup>16</sup>                                | 1 x Windows Server 2008 R2 VMs<br>1 VM per Host<br>4 vCPUs<br>20 GB Memory  |

<sup>14</sup> Designed to tolerate failure of any one physical machine

<sup>15</sup> Configure HyperV fail-over clustering

<sup>16</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

|  |  |
|--|--|
| <b>Back End Server (using SQL Server fail-over clustering)</b>         | 2 x PowerEdge R620<br>2 x 4-core Intel Xeon<br>32 GB Memory<br>2 x 146GB 2.5" 15k SAS                      |
| <b>Edge Servers<sup>17</sup></b>                                       | 2 x PowerEdge R320<br>1 x 4-core Intel Xeon<br>8 GB Memory<br>2 x 146GB 2.5" 15k SAS                       |
| <b>Storage Configuration</b>   | <b>Detail</b>  |
| <b>Storage for VMs, Back-End and Archiving+Monitoring<sup>18</sup></b> | Dell Equallogic PS 6100XV<br>24 x 146GB 2.5" 15k SAS in RAID 10  |
| <b>Network Configuration<sup>19</sup></b>                              | <b>Detail</b>  |
| <b>LAN Networking</b>  | 2 x Dell PowerConnect 6248 or<br>2 x Dell Force10 S55 Switches   |
| <b>SAN Networking</b>  | 2 x Dell Force10 S60 Switches  |
| <b>Additional Hardware</b>   | 4 x Quad Port Network Interface Cards <sup>20</sup><br>2 x Dual Port Network Interface Cards <sup>21</sup> |
| <b>VoIP Connectivity<sup>22</sup></b>                                  | PSTN Gateway or SIP Trunk  |

<sup>17</sup> Edge pool to be configured with DNS Load Balancing

<sup>18</sup> Consolidated Storage for smaller deployment

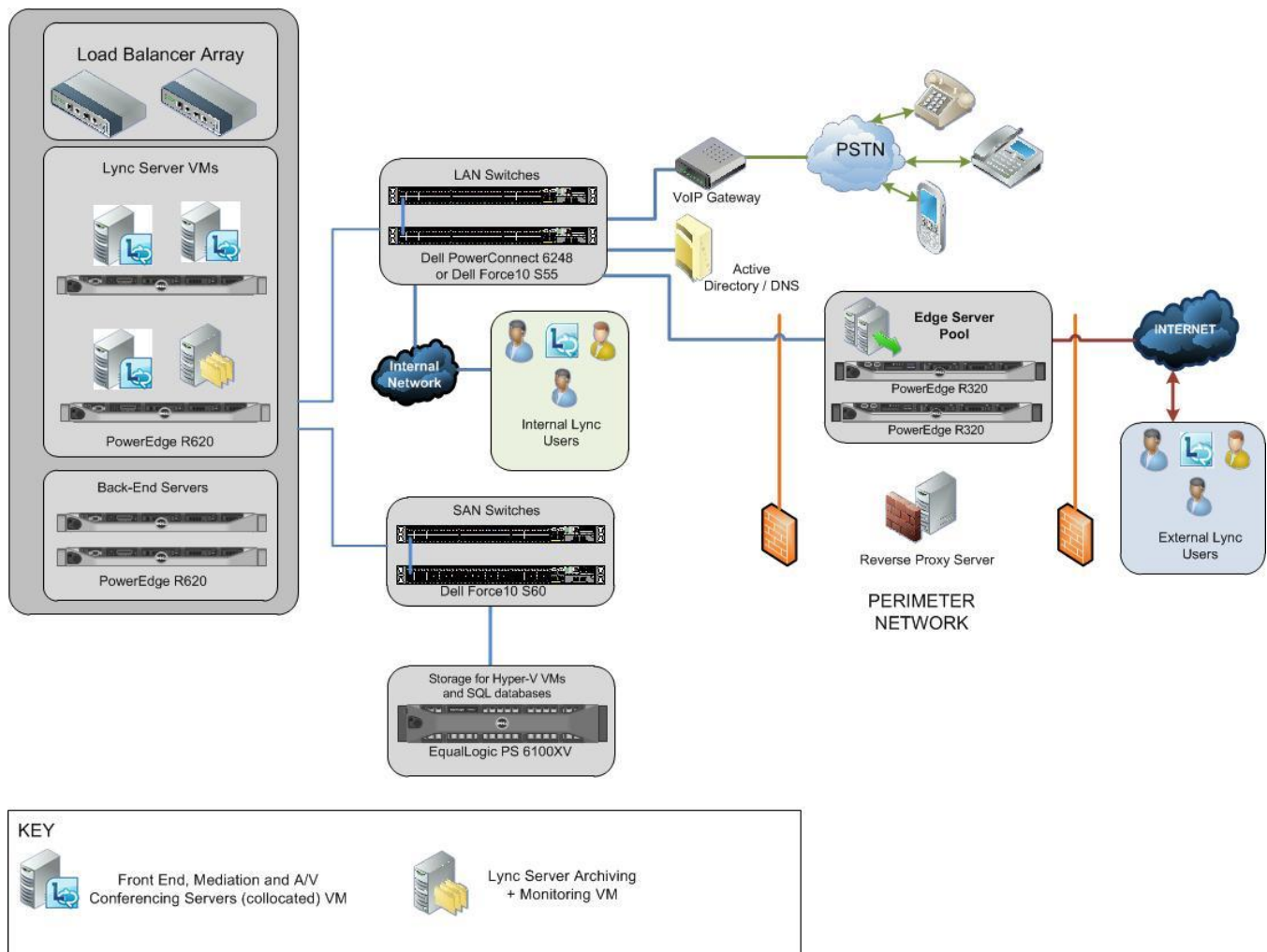
<sup>19</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>20</sup> Connectivity to Equallogic iSCSI SAN for 2 x Back-End, 2 x Front-End/Archiving+Monitoring

<sup>21</sup> Networking for Edge Servers: 1 card per server and 2 ports for internal access and 2 ports for external access

<sup>22</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation

## 4.4 Architecture Diagram



## 5 10,000 Users

### 5.1 Overview

This reference architecture is for medium-sized Lync deployments and can support Instant Messaging, Presence and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. The R620 can be replaced by T620 and the R420 by T420 with equivalent CPU and memory configuration, should Tower Servers be required. If the larger form factor R720s are required, this replacement is also possible. This solution's server, storage or networking design is highly-available and it is recommended that both controllers be used for the storage arrays, and the switches be used in a HA-pair. This Edge Server user model leverages the Microsoft recommendation of 8 cores per 15000 users. A reverse proxy is assumed to be present in the customer environment.

### 5.2 Solution Requirements

|                               |  |
|-------------------------------|--|
| Number of users               | 10,000 (Internal - 70% and External - 30%)       |
| High Availability             | Yes <sup>23</sup>                                |
| Virtualization                | Yes <sup>24</sup>                                |
| Number of Sites               | 1  |
| Number of Branch Offices      | 2 (500 users each)                               |
| Not included in this solution | Exchange servers (including UM)<br>Reverse Proxy |

### 5.3 Recommended Solution

| Server Configurations                         | Detail  |
|---|---|
| Microsoft Lync Server Version                 | Enterprise Edition  |
| Physical Server Configuration <sup>25</sup>   | 3 x PowerEdge R620<br>2 x 8-core Intel Xeon<br>64 GB Memory<br>2 x 300GB 2.5" 15k SAS |
| Front End, Mediation Server VMs in a pool     | 3 x Windows Server 2008 R2 VMs<br>1 VM per Host<br>4 vCPUs<br>16 GB Memory            |
| Audio/Video Conferencing Server VMs in a pool | 2 x Windows Server 2008 R2 VMs<br>1 VM per Host                                       |

<sup>23</sup> Designed to tolerate failure of any one physical machine

<sup>24</sup> Excludes Back End SQL Server

<sup>25</sup> Configure Hyper-V fail-over clustering

|  |  |
|--|--|
|  | 4 vCPUs<br>16 GB Memory  |
| <b>Archiving+Monitoring Server VM<sup>26</sup></b>             | 1 x Windows Server 2008 R2 VM<br>4 vCPUs<br>20 GB Memory   |
| <b>Back End Server (using SQL Server fail-over clustering)</b> | 2 x PowerEdge R620<br>2 x 4-core Intel Xeon<br>32 GB Memory<br>2 x 146GB 2.5" 15k SAS                      |
| <b>Edge Servers<sup>27</sup></b>                               | 2 x PowerEdge R420<br>1 x 4-core Intel Xeon<br>8 GB Memory<br>2 x 146GB 2.5" 15k SAS                       |
| <b>Survivable Branch Appliance<sup>28</sup></b>                | 2 (1 per branch office)  |
| <b>Network Configuration<sup>29</sup></b>                      | <b>Detail</b>  |
| <b>LAN Networking</b>  | 2 x Dell Force10 S55 Switches  |
| <b>SAN Networking</b>  | 2 x Dell Force10 S60 Switches  |
| <b>Storage Configuration</b>                                   | <b>Detail</b>  |
| <b>Storage for VMs</b>   | Dell Equallogic PS 6100XV<br>24 x 146GB 2.5" SAS 15k in RAID 10  |
| <b>Storage for Back-End and Archiving/Monitoring</b>           | Dell Equallogic PS 6100XV<br>24 x 146GB 2.5" SAS 15k in RAID 10  |
| <b>Additional Hardware</b>                                     | 5 x Quad Port Network Interface Cards <sup>30</sup><br>2 x Dual Port Network Interface Cards <sup>31</sup> |
| <b>VoIP Connectivity<sup>32</sup></b>                          | PSTN Gateway or SIP Trunking   |

<sup>26</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

<sup>27</sup> Edge pool to be configured with DNS Load Balancing

<sup>28</sup> From approved SBA vendor from Microsoft

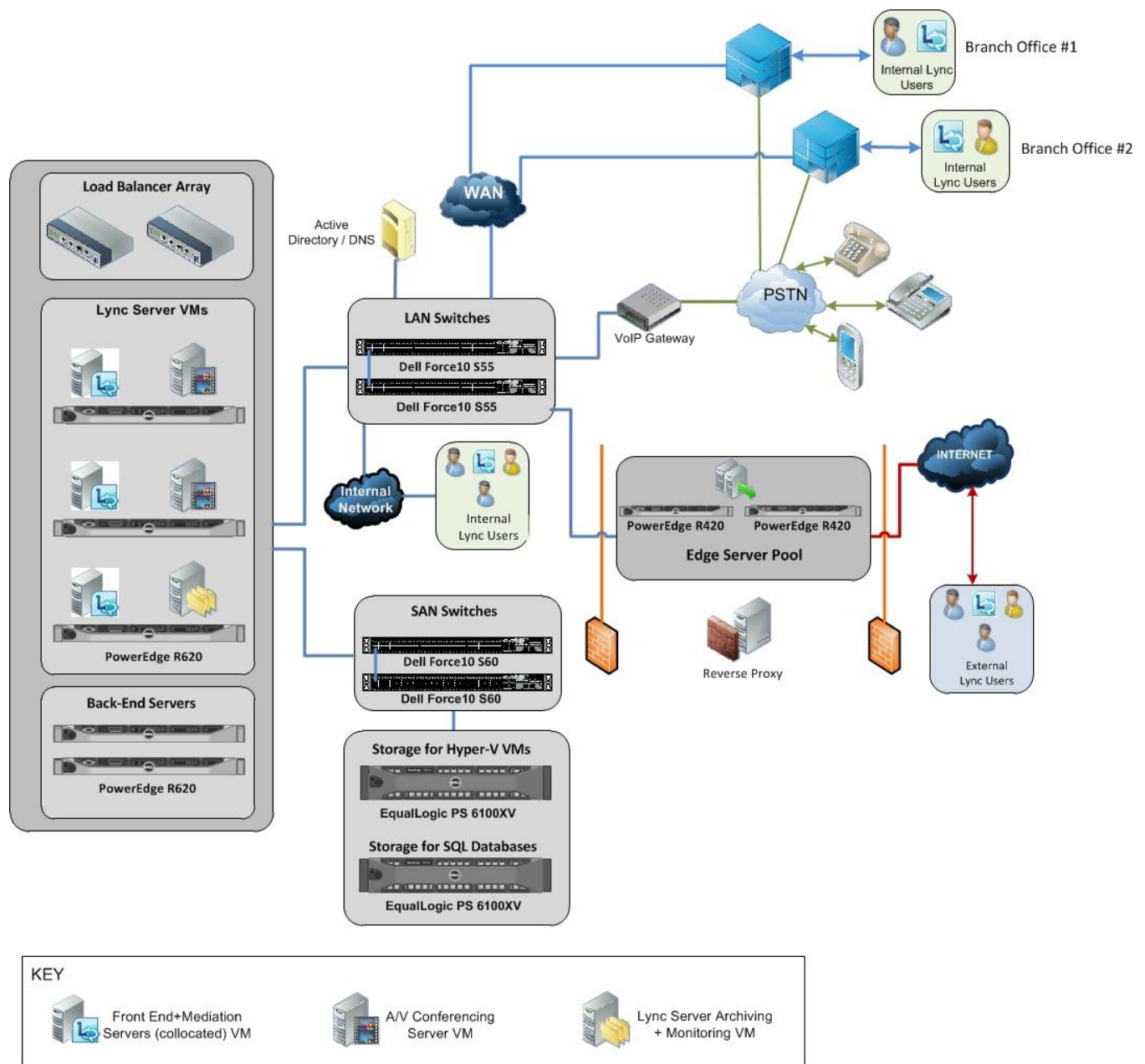
<sup>29</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>30</sup> Connectivity to Equallogic iSCSI SAN: 3 for physical servers and 2 for back-end SQL

<sup>31</sup> Connectivity for Edge Servers. 2 ports per server for internal and 2 ports per server for external.

<sup>32</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation

## 5.4 Architecture Diagram



## 6 15,000 Users

### 6.1 Overview

This reference architecture is for medium-large Lync deployments and can support Instant Messaging, Presence and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. The R720 can be replaced by R620 or T620, based on requirements. The R420 can be replaced by T420. This solution's server, storage or networking design is highly-available and it is recommended that both controllers be used for the storage arrays, and the switches be used in a HA-pair. This Edge Server user model leverages the Microsoft recommendation of 8 cores per 15000 users. A reverse proxy is assumed to be present in the customer environment.

### Solution Requirements

|                               |  |
|-------------------------------|--|
| Number of users               | 15000  |
| High Availability             | Yes <sup>33</sup>                                |
| Virtualization                | Yes <sup>34</sup>                                |
| Number of Sites               | 1  |
| Not included in this solution | Exchange servers (including UM)<br>Reverse Proxy |

### 6.2 Recommended Solution

| Server Configurations                        | Detail   |
|--|--|
| Microsoft Lync Server Version                | Enterprise Edition   |
| Physical Server Configuration <sup>35</sup>  | 4 x PowerEdge R720<br>2 x 8-core Intel Xeon<br>64GB Memory<br>2 x 300GB 2.5" 15k SAS           |
| Front-End and Mediation Server VMs in a pool | 4 x Windows Server 2008 R2 VMs<br>1 x VM on each host<br>4 vCPUs per VM<br>16 GB Memory per VM |
| A/V Conferencing Server VMs in a pool        | 2 x Windows Server 2008 R2 VMs<br>1 x VM on 2 hosts<br>4 vCPUs per VM<br>16 GB Memory per VM   |

<sup>33</sup> Designed to tolerate failure of any one physical machine

<sup>34</sup> Excludes Back End SQL Server

<sup>35</sup> Configure HyperV fail-over clustering



|   |   |
|---|---|
| <b>Director VMs in a pool</b>                                       | 2 x Windows Server 2008 R2 VMs<br>1 x VM on 2 hosts<br>4 vCPUs per VM<br>4 GB Memory per VM |
| <b>Archiving+Monitoring Virtual Machine<sup>36</sup></b>            | 1 x Windows Server 2008 R2 VMs<br>4 vCPUs per VM<br>20 GB Memory per VM                     |
| <b>Back-End Server (using SQL Server fail-over clustering)</b>      | 2 x PowerEdge R720<br>2 x 4-core Intel Xeon<br>32 GB Memory<br>2 x 146GB 2.5" 15k SAS       |
| <b>Edge Servers<sup>37</sup></b>                                    | 2 x PowerEdge R420<br>2 x 4-core Intel Xeon<br>16 GB Memory<br>2 x 146GB 2.5" 15k SAS       |
| <b>Storage Configuration</b>  | <b>Detail</b>   |
| <b>Storage for VMs</b>  | Dell Equallogic PS 6100XV iSCSI SAN<br>24 x 146GB 2.5" SAS 15k in RAID 10                   |
| <b>Storage for Back-End Database, Archiving/Monitoring Database</b> | Dell Equallogic PS 6100XV iSCSI SAN<br>24 x 146GB 2.5" SAS 15k in RAID 10                   |
| <b>Additional Hardware</b>  | 6 x Quad Port Network Interface Cards <sup>38</sup>   |
| <b>Networking Configuration<sup>39</sup></b>                        | <b>Detail</b>   |
| <b>LAN Networking</b>   | 2 x Dell Force10 S55 Switches   |
| <b>SAN Networking</b>   | 2 x Dell Force10 S60 Switches   |
| <b>VoIP Connectivity<sup>40</sup></b>                               | <b>PSTN Gateway or SIP Trunking</b>   |

<sup>36</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

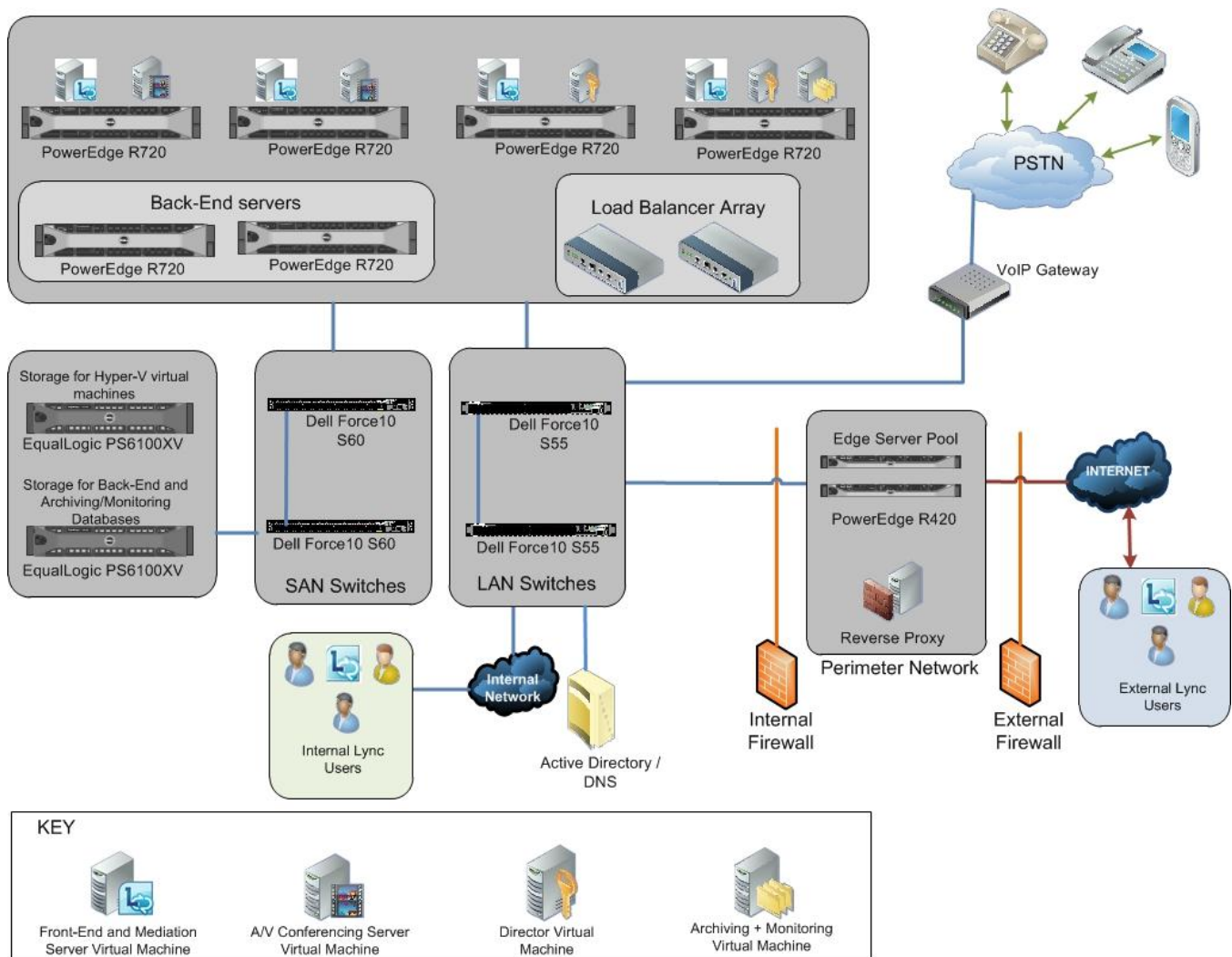
<sup>37</sup> Edge pool to be configured with DNS Load Balancing

<sup>38</sup> Connectivity to Equallogic iSCSI SAN: 4 for physical servers and 2 for back-end SQL

<sup>39</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>40</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation

## 6.3 Architecture Diagram



## 7 25,000 Users

### 7.1 Overview

This reference architecture is for a large Lync deployment and can support Instant Messaging, Presence and Audio-Video Conferencing. For details on VoIP inter-operability with a PBX, VoIP Gateway, SIP Trunk or other telephony hardware, please contact Dell Infrastructure Consulting. To minimize datacenter footprint, blade servers are used in this architecture. However, if rack servers are preferred, then the M620 blades can be replaced by equivalent R620 servers. This solution's server, storage or networking design is highly-available and it is recommended that both controllers be used for the storage arrays, and the switches be used in a HA-pair. This Edge Server user model leverages the Microsoft recommendation of 8 cores per 15000 users and tolerates a single server failure. A reverse proxy is assumed to be present in the customer environment.

### 7.2 Solution Requirements

|                               |  |
|-------------------------------|--|
| Number of users               | 25,000   |
| High Availability             | Yes <sup>41</sup>                                |
| Virtualization                | Yes <sup>42</sup>                                |
| Number of Sites               | 1 <sup>43</sup>                                  |
| Number of Branch Offices      | 2 (500 users each)                               |
| Not included in this solution | Exchange servers (including UM)<br>Reverse Proxy |

### 7.3 Recommended Solution

| Server Configurations                         | Detail  |
|---|---|
| Microsoft Lync Server Version                 | Enterprise Edition  |
| Physical Server Configuration <sup>44</sup>   | 6 x PowerEdge M620<br>2 x 6-core Intel Xeon<br>64 GB of RAM<br>2 x 300GB 2.5" 15k SAS       |
| Front End, Mediation Server VMs in a pool     | 6 x Windows Server 2008 R2 VMs<br>1 VM on each host<br>4 vCPUs per VM<br>16GB Memory per VM |
| Audio/Video Conferencing Server VMs in a pool | 3 x Windows Server 2008 R2 VMs<br>1 VM on each host   |

<sup>41</sup> Designed to tolerate failure of any one physical machine

<sup>42</sup> Excludes Back End SQL Server

<sup>43</sup> To scale up in another site, replicate configuration for Virtualization and Back End servers from this or other reference configurations in this booklet

<sup>44</sup> Configure HyperV fail-over clustering

|   |   |
|---|---|
|   | 4 vCPUs per VM<br>16GB Memory per VM  |
| <b>Lync Server Director VMs in a pool</b>                           | 3 x Windows Server 2008 R2 VMs<br>1 VM on each host<br>4 vCPUs per VM<br>4GB Memory per VM                              |
| <b>Archiving+Monitoring VM<sup>45</sup></b>                         | 1 x Windows Server 2008 R2 VM<br>4 vCPUs<br>20GB of Memory  |
| <b>Back End Server (using SQL Server fail-over clustering)</b>      | 2 x PowerEdge M620<br>2 x 6-core Intel Xeon<br>32 GB Memory<br>2 x 146GB 2.5" 15k SAS                                   |
| <b>Edge Servers<sup>46</sup></b>                                    | 3 x PowerEdge R420<br>2 x 4-core Intel Xeon<br>16 GB Memory<br>2 x 146GB 2.5" 15k SAS                                   |
| <b>Survivable Branch Appliance<sup>47</sup></b>                     | <b>2 (1 per branch office)</b>  |
| <b>Storage Configuration</b>  | <b>Detail</b>   |
| <b>Storage for VMs</b>  | Dell Equallogic PS 6100XV iSCSI SAN<br>24 x 146GB 2.5" SAS 15k in RAID 10   |
| <b>Storage for Back-End Database, Archiving/Monitoring Database</b> | Dell Equallogic PS 6100XV iSCSI SAN<br>24 x 146GB 2.5" SAS 15k in RAID 10   |
| <b>Additional Hardware</b>  | 9 x 1Gbps dual-port mezzanine cards <sup>48</sup><br>3 x 1Gbps dual-port NICs <sup>49</sup><br>1 x M1000e blade chassis |
| <b>Networking Configuration<sup>50</sup></b>                        | <b>Detail</b>   |
| <b>LAN Networking</b>   | 2 x Dell Force10 S55 Switches<br>2 x Dell PowerConnect M6348 Chassis Switches   |
| <b>SAN Networking</b>   | 2 x Dell Force10 S60 Switches<br>2 x Dell PowerConnect M6348 Chassis Switches   |
| <b>VoIP Connectivity<sup>51</sup></b>                               | <b>PSTN Gateway or SIP Trunking</b>   |

<sup>45</sup> Requires SQL Server 2008 R2, 2008 SP1, or 2005 SP3 in addition to Lync Server role

<sup>46</sup> Edge pool to be configured with DNS Load Balancing

<sup>47</sup> From Microsoft approved SBA vendor

<sup>48</sup> Connectivity to Equallogic iSCSI SAN for each host

<sup>49</sup> Connectivity for Edge. 2 ports for internal network and 2 ports for external network per server.

<sup>50</sup> VoIP clients may require the use of Power over Ethernet (PoE) switches

<sup>51</sup> Dell Infrastructure Services Consulting engagement is recommended for VoIP implementation

## 7.4 Architecture Diagram

