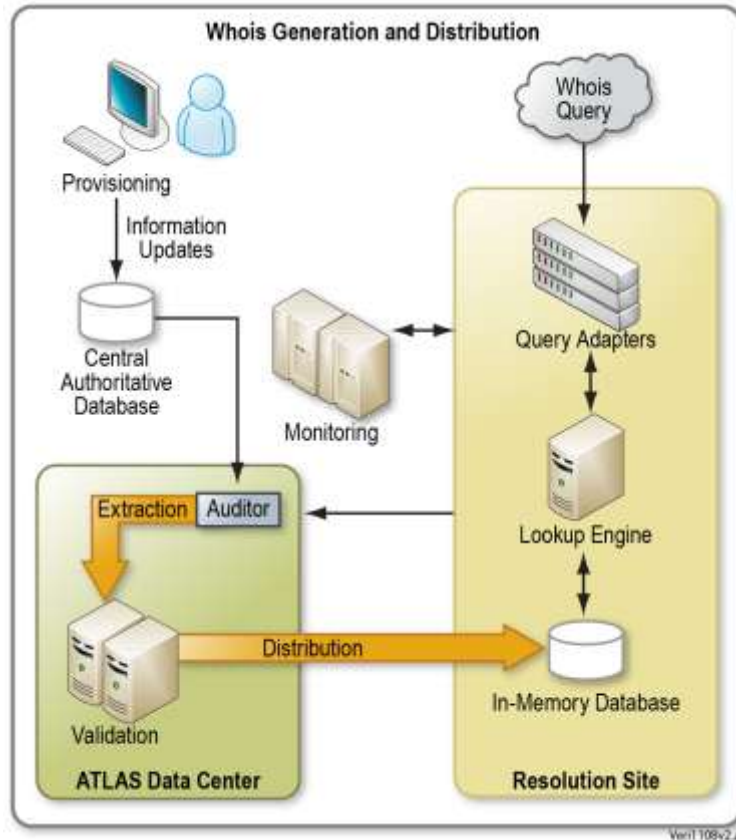


**Figure 26-1**



**Figure 26-1: Whois Service Network Diagram.** *By distributing Whois service across multiple resolution sites, Whois transactions are highly available and performed with low latency.*

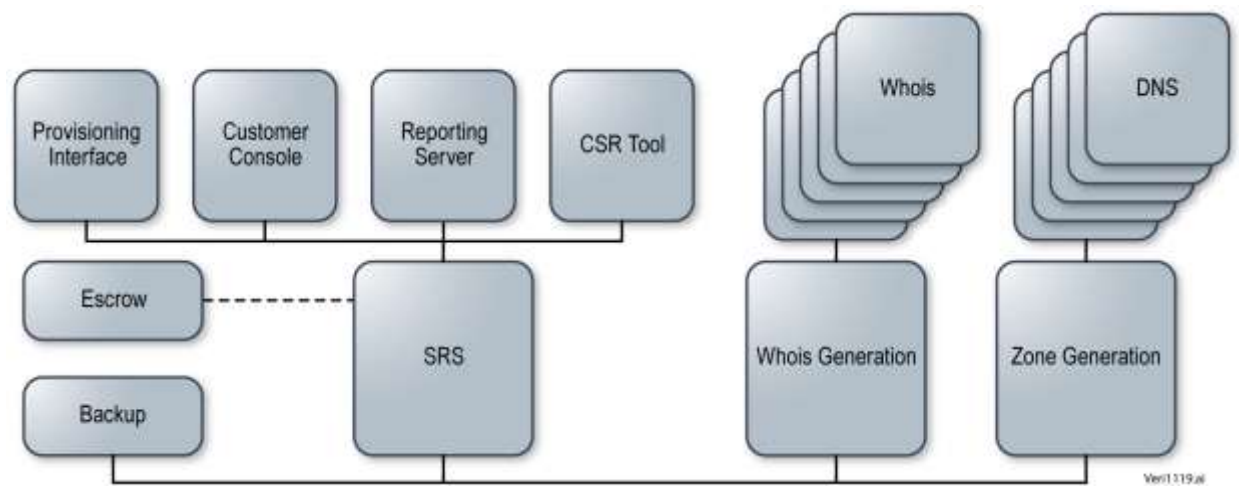
**Figure 26-2**

Component	Implementation/Configuration
<b>Load Balancers</b>	<ul style="list-style-type: none"> <li>• Deployed as a pair for maximum availability and resilience.</li> <li>• Help ensure workload is evenly distributed across all systems within the .BING gTLD resolution network.</li> </ul>
<b>Layer-3 Switches</b>	<ul style="list-style-type: none"> <li>• Four switches are installed in Verisign's resolution network environment: two for front-office management, and two for back-office management.</li> <li>• Switches provide both routing and switching for the .BING gTLD environment across the front-office network.</li> </ul>
<b>Terminal Servers</b>	<ul style="list-style-type: none"> <li>• Deployed as a pair of terminal servers to enable out-of-band management of all network hardware.</li> <li>• Used in the event that primary network access is unavailable at Verisign's primary resolution sites.</li> </ul>
<b>Virtual Private Networks (VPN)</b>	<ul style="list-style-type: none"> <li>• Pair of VPNs installed at each of Verisign's primary resolution sites for secure remote access to the installed systems.</li> </ul>
<b>Commodity Servers</b>	Supporting Whois data processing needs, each commodity server consists of the following specifications: <ul style="list-style-type: none"> <li>• Two central processing units (CPUs)</li> </ul>

	<ul style="list-style-type: none"> <li>• 2 – 6 gigabytes (GB) random access memory (RAM) (as dictated by the server function)</li> <li>• 2x73GB hard drive</li> </ul>
<b>Database Servers</b>	Supporting Whois data processing needs, each database server consists of the following specifications: <ul style="list-style-type: none"> <li>• 16 cores (4 x quad-core CPUs)</li> <li>• 64GB RAM</li> <li>• 5x73GB hard drive</li> </ul>

**Figure 26-2: Whois IT and Infrastructure Resources.** *Verisign uses a common Whois resolution network architecture at each primary site provisioning the Whois service.*

**Figure 26-3**



**Figure 26-3: Technical Overview.** *Verisign's Whois services are co-located at DNS locations.*

**Figure 26-4**

Domain Name Data <b>Query format:</b> whois EXAMPLE.TLD Response format: Domain Name: EXAMPLE.TLD Domain ID: D1234567-TLD Whois Server: whois.example.tld Referral URL: <a href="http://www.example.tld">http://www.example.tld</a> Updated Date: 2009-05-29T20:13:00Z Creation Date: 2000-10-08T00:45:00Z Expiration Registry Expiry Date: 2010-10-08T00:44:59Z Sponsoring Registrar: EXAMPLE REGISTRAR LLC Sponsoring Registrar IANA ID: 5555555 Domain Status: clientDeleteProhibited Domain Status: clientRenewProhibited Domain Status: clientTransferProhibited Domain Status: serverUpdateProhibited Registrant ID: 5372808-ERL
--

Registrant Name: EXAMPLE REGISTRANT  
Registrant Organization: EXAMPLE ORGANIZATION  
Registrant Street: 123 EXAMPLE STREET  
Registrant City: ANYTOWN  
Registrant State/Province: AP  
Registrant Postal Code: A1A1A1  
Registrant Country: EX  
Registrant Phone: +1.5555551212  
Registrant Phone Ext: 1234  
Registrant Fax: +1.5555551213  
Registrant Fax Ext: 4321  
Registrant Email: [EMAIL@EXAMPLE.TLD](mailto:EMAIL@EXAMPLE.TLD)  
Admin ID: 5372809-ERL  
Admin Name: EXAMPLE REGISTRANT ADMINISTRATIVE  
Admin Organization: EXAMPLE REGISTRANT ORGANIZATION  
Admin Street: 123 EXAMPLE STREET  
Admin City: ANYTOWN  
Admin State/Province: AP  
Admin Postal Code: A1A1A1  
Admin Country: EX  
Admin Phone: +1.5555551212  
Admin Phone Ext: 1234  
Admin Fax: +1.5555551213  
Admin Fax Ext: 4321  
Admin Email: [EMAIL@EXAMPLE.TLD](mailto:EMAIL@EXAMPLE.TLD)  
Tech ID: 5372811-ERL  
Tech Name: EXAMPLE REGISTRAR TECHNICAL  
Tech Organization: EXAMPLE REGISTRAR LLC  
Tech Street: 123 EXAMPLE STREET  
Tech City: ANYTOWN  
Tech State/Province: AP  
Tech Postal Code: A1A1A1  
Tech Country: EX  
Tech Phone: +1.1235551234  
Tech Phone Ext: 1234  
Tech Fax: +1.5555551213  
Tech Fax Ext: 93  
Tech Email: [EMAIL@EXAMPLE.TLD](mailto:EMAIL@EXAMPLE.TLD)  
Name Server: NS01.EXAMPLEREGISTRAR.TLD  
Name Server: NS02.EXAMPLEREGISTRAR.TLD  
DNSSEC: signedDelegation  
DNSSEC: unsigned  
>>> Last update of Whois database: 2009-05-29T20:15:00Z <<<

**Figure 26-4: Domain Name Data Object**

**Figure 26-5**

```
Registrar Data
Query format: whois "registrar Example Registrar, Inc."
Response format:
Registrar Name: Example Registrar, Inc.
Street: 1234 Admiralty Way
City: Marina del Rey
State/Province: CA
Postal Code: 90292
Country: USA
Phone Number: +1.3105551212
Fax Number: +1.3105551213
Email: registrar@example.tld
Whois Server: whois.example-registrar.tld
Referral URL: http://www.example-registrar.tld
Admin Contact: Joe Registrar
Phone Number: +1.3105551213
Fax Number: +1.3105551213
Email: joeregistrar@example-registrar.tld
Admin Contact: Jane Registrar
Phone Number: +1.3105551214
Fax Number: +1.3105551213
Email: janeregistrar@example-registrar.tld
Technical Contact: John Tech
Phone Number: +1.3105551215
Fax Number: +1.3105551216
Email: johntech@example-registrar.tld
>>> Last update of Whois database: 2009-05-29T20:15:00Z <<<
```

**Figure 26-5: Registrar Data Object**

**Figure 26-6**

```
Name Server Data
Query format: whois "NS1.EXAMPLE.TLD" or whois "name server (IP address)"
Response format:
Server Name: NS1.EXAMPLE.TLD
IP Address: 192.0.2.123
IP Address: 2001:0DB8::1
Registrar: Example Registrar, Inc.
Whois Server: whois.example-registrar.tld
Referral URL: http://www.example-registrar.tld
>>> Last update of Whois database: 2009-05-29T20:15:00Z <<<
```

**Figure 26-6: Name Server Data Object**

**Figure 26-7**

Potential Abusive Searchable Whois Risks	Verisign Risk Mitigation
Single Source Data Mining  The mining of Whois data from a single IP address conducted through manual queries	Access Control Lists (ACL): Implementation of an ACL at the network layer to block the offending IP address for a specified period of time; viable option given a single unique IP address  Application Rate Limiting: Implementation of rate-limiting at the application layer to regulate the number of queries allowed from the source IP address for a specified period of time; viable option given a single unique IP address
Automated Data Mining  Single Source: The mining of Whois data from a single IP address conducted through the use of automated scripts  Distributed: The mining of Whois data from multiple sources/IP addresses conducted through the use of automated scripts, or, “botnets”	ACL and Application Rate Limiting as defined for single source data mining  Packet Inspection: Implementation of tools that analyze the incoming “get” request to determine whether the source is a valid user or whether the request is coming from an automated script or botnet; viable option based on “get” request signature  Completely Automated Public Turing Test To Tell Computers And Humans Apart (CAPTCHA) Techniques: Implementation of a challenge-response test prior to processing the request; viable option that limits ability to predict challenge-response; almost always requires manual interaction

**Figure 26-7: Potential Searchable Whois Forms of Abuse and Mitigation.** *Verisign leverages its experience supporting the .name registry to build in to the system the safeguards necessary to minimize abusive Whois practices.*