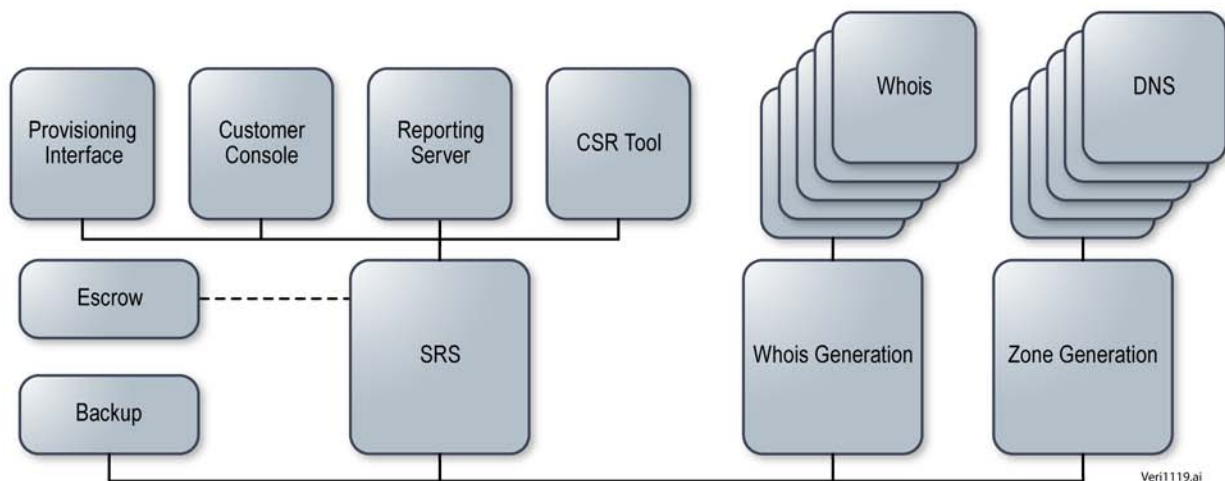


**Figure 26-1: Whois Service Network Diagram.** *By distributing Whois service across multiple resolution sites, Whois transactions are highly available and performed with low latency.*

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 .CAREER 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 .CAREER 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> <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: Technical Overview.** Verisign's Whois services are co-located at DNS locations.

Domain Name Data

**Query format:** whois EXAMPLE.TLD

Response format:

Domain Name: EXAMPLE.TLD

Domain ID: D1234567-TLD

Whois Server: whois.example.tld

Referral URL: <http://www.example.tld>

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
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**

```
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**

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**

Potential Abusive Searchable Whois Risks	Verisign Risk Mitigation
<p>Single Source Data Mining</p> <p>The mining of Whois data from a single IP address conducted through manual queries</p>	<p>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</p> <p>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</p>
<p>Automated Data Mining</p> <p>Single Source: The mining of Whois data from a single IP address conducted through the use of automated scripts</p> <p>Distributed: The mining of Whois data from multiple sources/IP addresses conducted through the use of automated scripts, or, "botnets"</p>	<p>ACL and Application Rate Limiting as defined for single source data mining</p> <p>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</p> <p>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</p>

**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.*