## Path Validation Tiers

<table>
<thead>
<tr>
<th>Path Validation Module Name</th>
<th>Name Constraints</th>
<th>Policy Mapping</th>
<th>anyPolicy</th>
<th>Indirect CRLs</th>
<th>Reasons</th>
<th>Delta-CRLs</th>
<th>DSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge-enabled PVM with Advanced CRLs [,f, and g]</td>
<td>✔️</td>
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<td>✔️</td>
<td>f</td>
<td>g</td>
</tr>
<tr>
<td>Bridge-enabled PVM [with d, e, f, and g]</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
</tr>
<tr>
<td>Enterprise PVM with Advanced CRLs[, a, b, c, f, and g]</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>✔️</td>
<td>✔️</td>
<td>f</td>
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✔️: required package for this naming scheme

Optional packages:

- **a**: Name Constraints
- **b**: Policy Mapping
- **c**: anyPolicy
- **d**: Indirect CRLs
- **e**: Reasons
- **f**: Delta-CRLs
- **g**: DSA

From the draft [NIST Recommendation for X.509 Path Validation](https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-94.pdf)
Path Discovery – Location Tiers

• Level 1:
  − Directory based path discovery – locate certificates and CRLs based on DNs in issuer and subject fields and cRLDistributionPoints extension.

  or

  − URI based path discovery – locate certificates and CRLs based on LDAP and HTTP URIs in authorityInfoAccess, subjectInfoAccess, and cRLDistributionPoints extensions.

• Level 2: Both Directory based and URI based path discovery
Path Discovery – Architecture Tiers

- **Rudimentary**
  - Only need to construct certification paths in a hierarchical PKI, but hierarchy is part of a mesh (the PKI architecture for Basic tests)
  - No constraints in paths to be constructed
  - Self-issued certificates
  - Certificates and CRLs signed with different keys

- **Basic**
  - Mesh architecture with only one path from any CA to any other CA
  - Name constraints and policy mappings
Path Discovery – Architecture Tiers

- **Intermediate**
  - Multiple paths between CAs. Constraints may result in one path being valid and another being invalid.

- **Advanced**
  - TBD. Some features of Advanced architecture may include
    - Missing and mismatched key identifiers
    - More complicated key rollover tests
Combined Tiers

- **Tier 1:**
  - Enterprise PVM
  - Path Discovery (Level 1 Locater, Rudimentary Architecture)

- **Tier 2:**
  - Enterprise PVM with Name Constraints and Policy Mappings
  - Path Discovery (Level 1 Locater, Basic Architecture)

- **Tier 3:**
  - Bridge-enabled PVM
  - Path Discovery (Level 2 Locater, Intermediate Architecture)

- **Tier 4:**
  - Bridge-enabled PVM
  - Path Discovery (Level 2 Locater, Advanced Architecture)