

Content Delivery/Distribution Networks (CDN)

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- Consists of geographically distributed network of servers around the globe.

- Improvement goals:

- ◆ Scalability

- Ability to expand in order to handle new and large amounts of data, users and transactions without any significant decline in performance.
- Dynamically allocation of resources to address flash crowds and varying traffic.
- Acts as a shock absorber for traffic by automatically providing capacity-on-demand to meet the requirements
- Avoids costly over-provisioning of resources and provides high performance to every user.

- ◆ Security

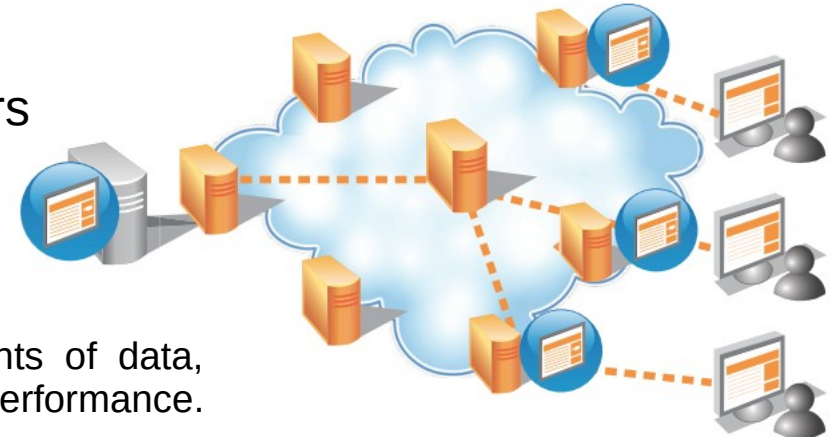
- Provides protection of content against unauthorized access and modification, distributed denial-of-service (DdoS) attacks, viruses, and other unwanted intrusions.
- Eliminates the need for costly hardware and dedicated component to protect content and transactions.

- ◆ Reliability, Responsiveness and Performance

- Improves client access to content through delivering it from multiple locations.
- The reliability and performance is affected by the distributed content location and routing mechanism, as well by data replication and caching strategies.

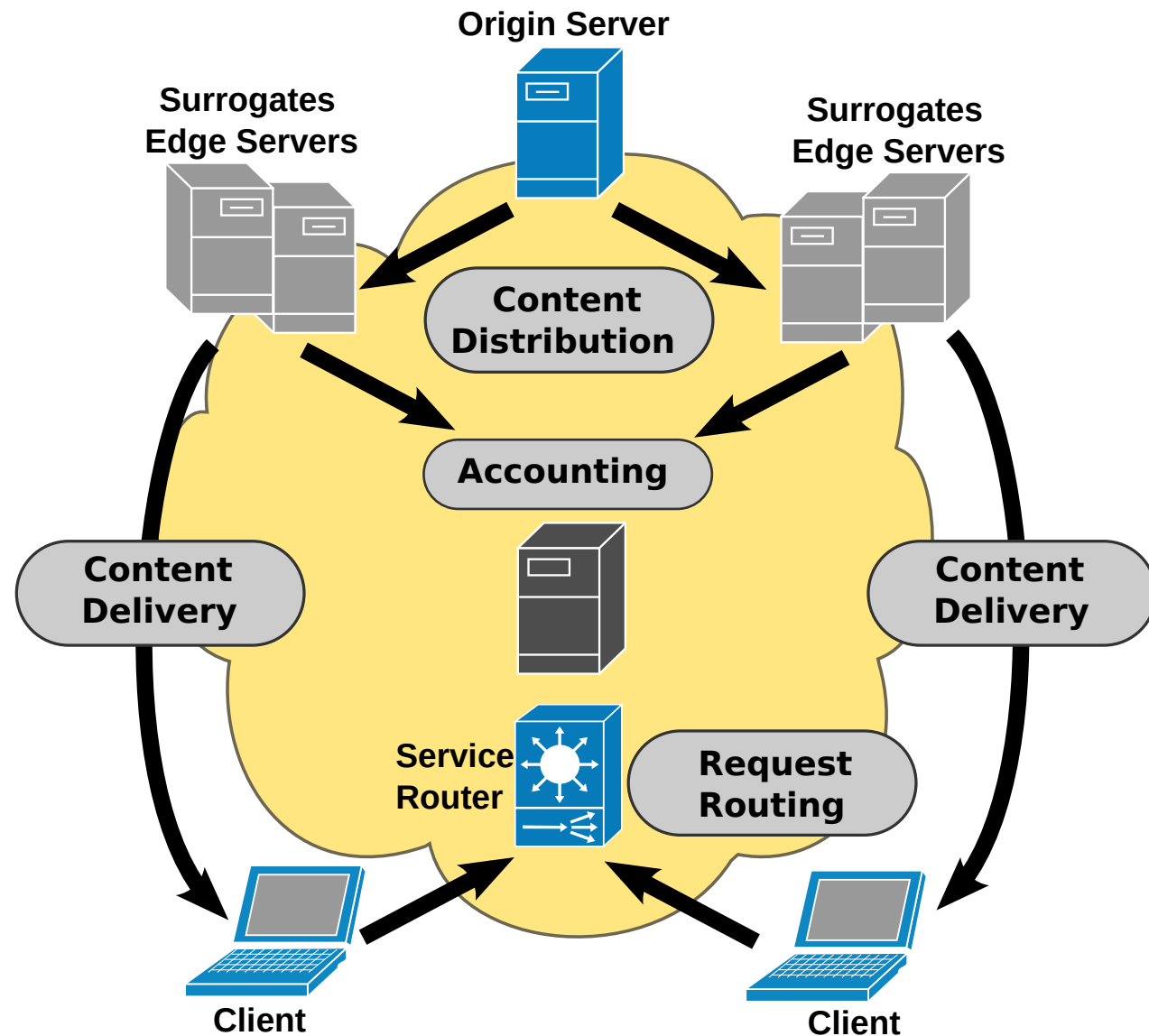
- Evolution

- ◆ First Generation: Focused on Static or Dynamic Web Document.
- ◆ Second Generation: Focused on Video-on-Demand (VoD), audio and video streaming.



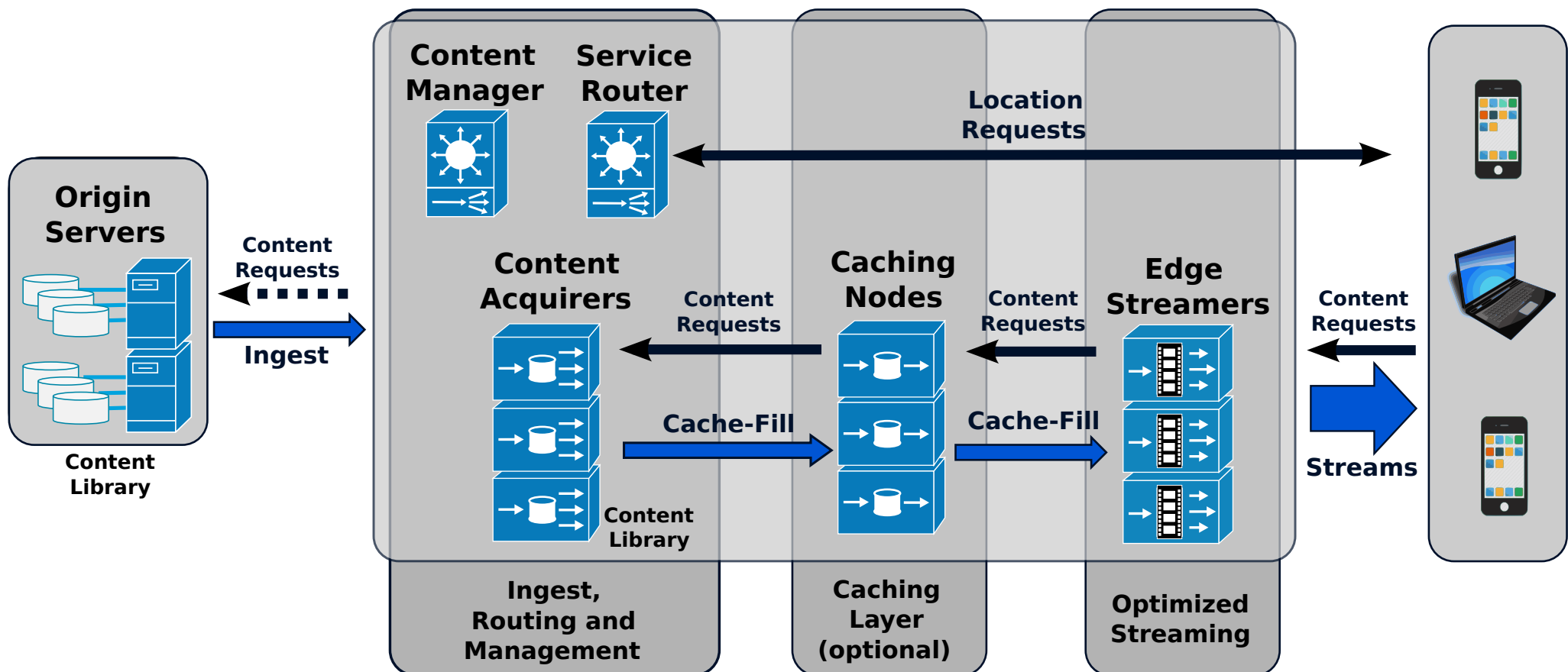
CDN Components

- **Content Delivery Infrastructure**
 - ♦ Delivering content to clients from Surrogates (Edge Servers).
- **Request Routing Infrastructure**
 - ♦ Steering or directing content request from a client to a suitable Surrogate.
- **Content Distribution Infrastructure**
 - ♦ Moving or replicating content from content source (origin server, content provider) to surrogates.
- **Accounting Infrastructure**
 - ♦ Logging and reporting of distribution and delivery activities.



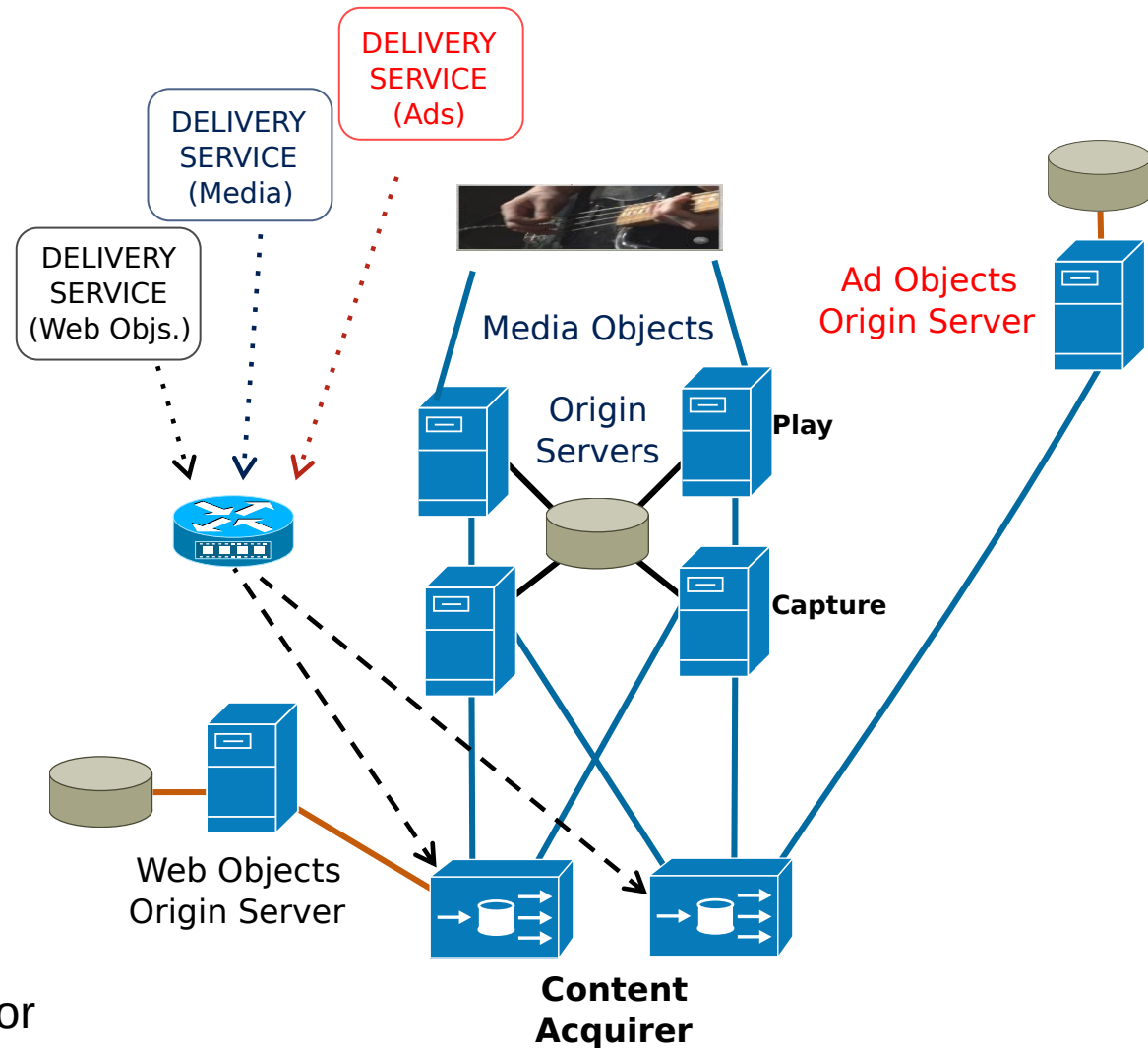
CDN for VoD and Streaming

- VoD and Streaming have QoS strict requirements.
- Surrogates become:
 - ◆ Content Acquirers
 - ◆ Cache Nodes
 - ◆ Edge Streamers



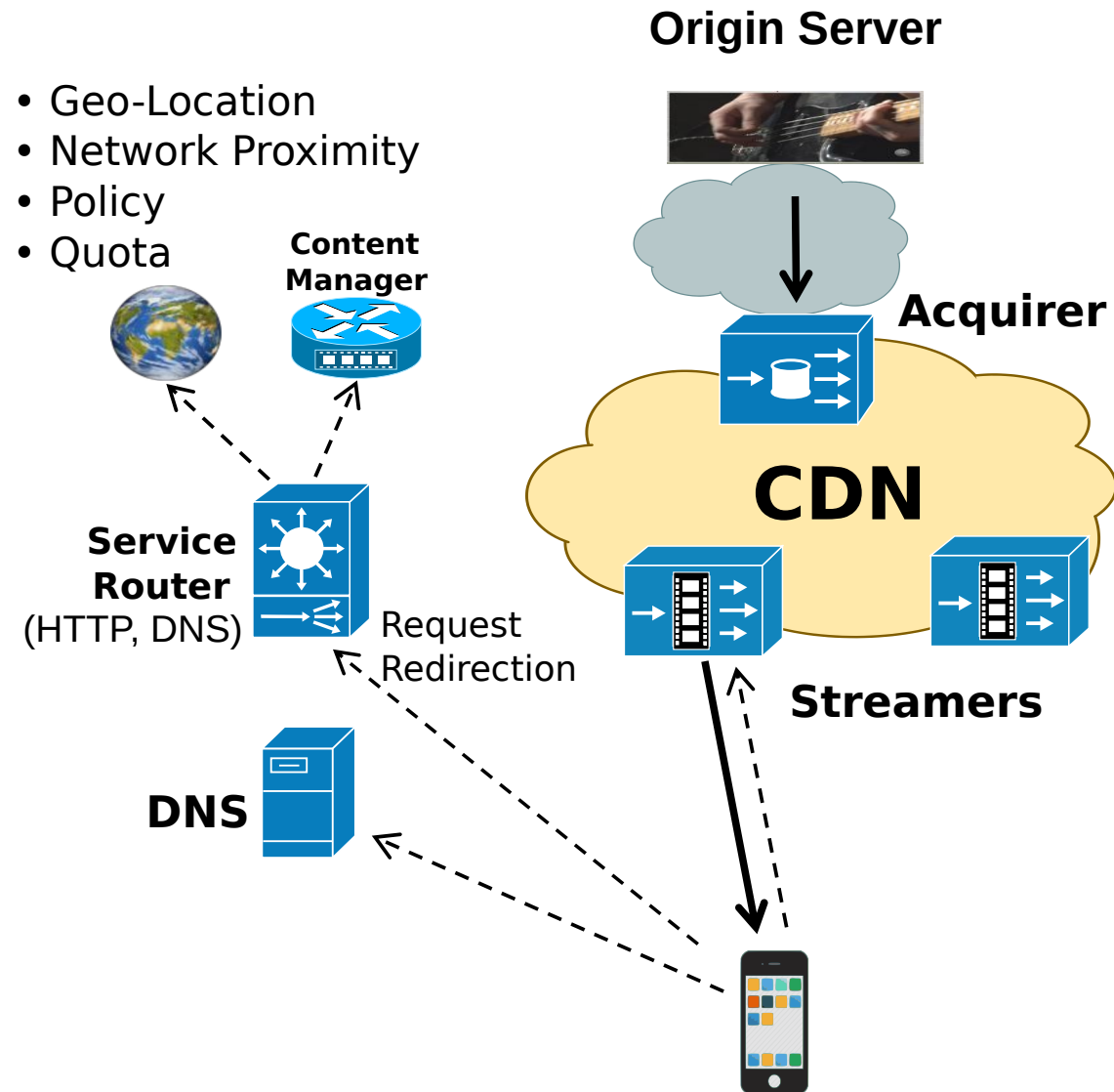
Origin Servers

- Origin Servers (OS)
 - Organized Media on Storage.
 - Authorize Acquirers.
 - Package Content.
- Ingest must be flexible, resilient and secure.
- CDN can ingest from multiple Origin Servers.
 - Local or Remote locations.
- Origins can be replicated.
 - Locally (load balancing).
 - Remotely (disaster recovery).
- Origins can have structure.
 - Security.
 - Capture/Recording/Playout separation for better scalability.

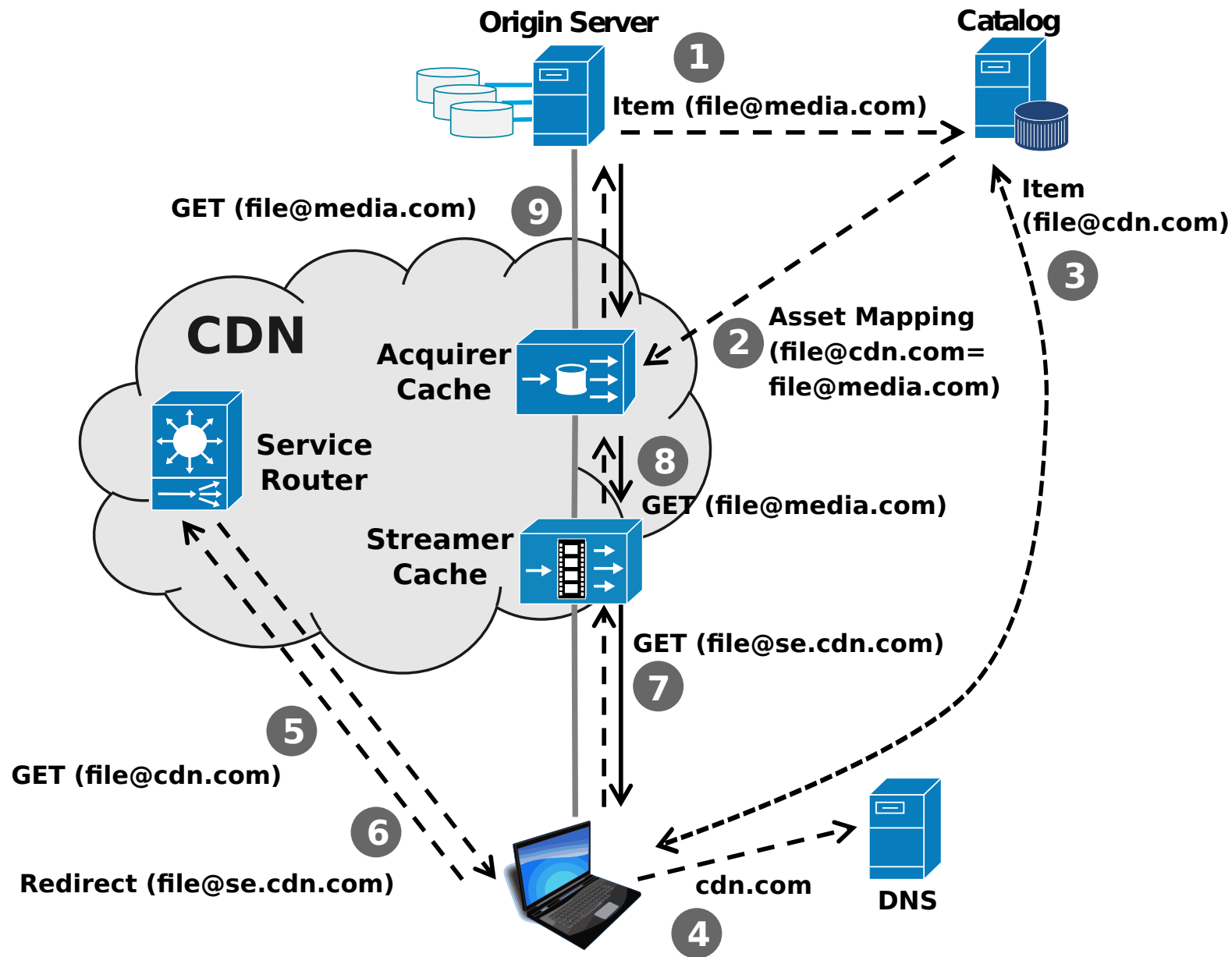


Routing Service

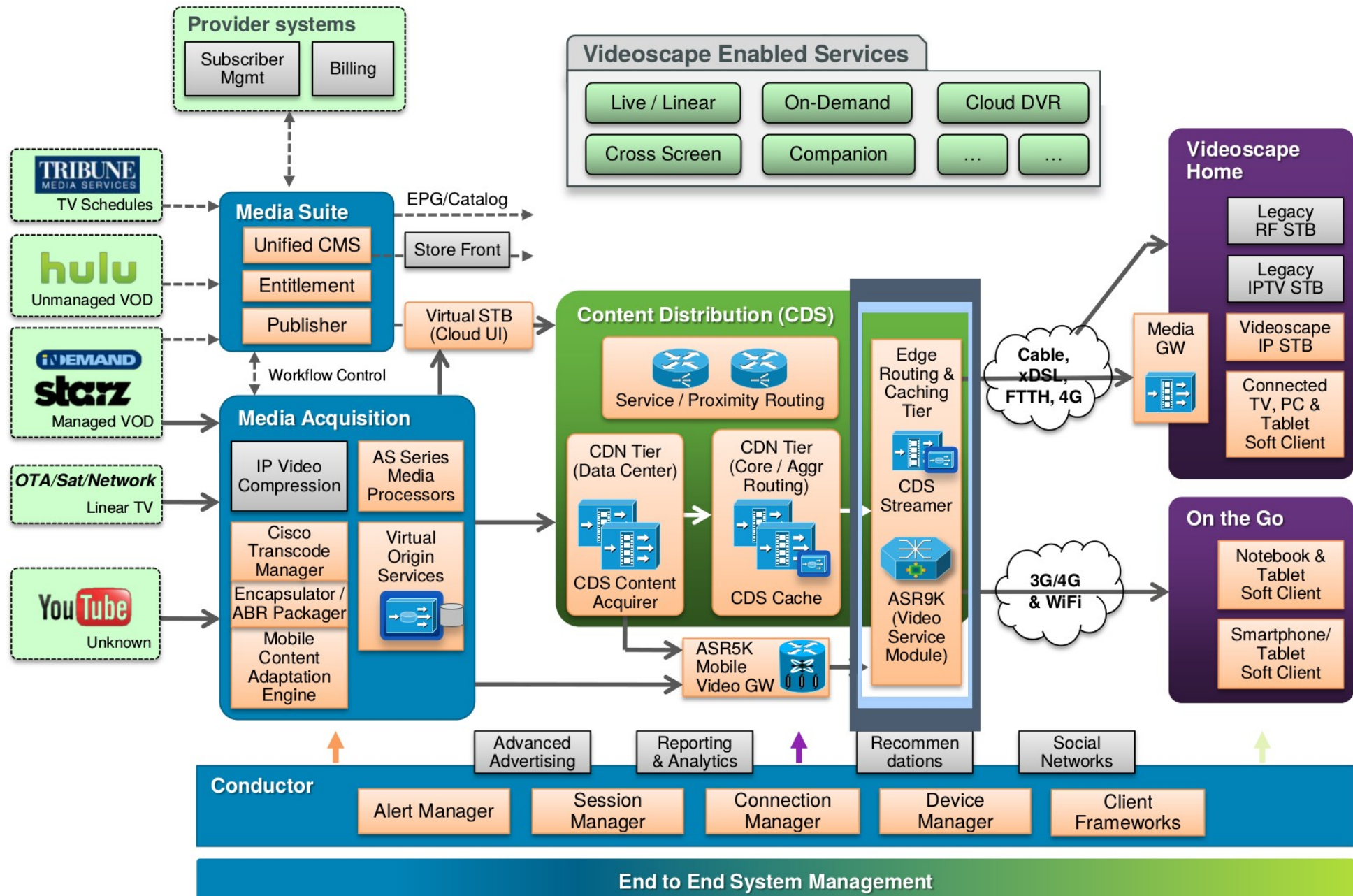
- Request Redirection model.
 - Service Router is the Authoritative DNS for “Delivery Service”.
- HTTP-based 30x redirection.
 - Service Router resolves domain name to its own IP address.
 - Service Router then uses HTTP 302/307 redirection to a Streamer.
- DNS-based redirection.
 - Service Router resolves domain to IP address of Streamer.
- Service Router Criteria.
 - Based on Client IP Address.
 - Determines Geo-Location, Network Proximity, Policy, and/or Quota.



CDN Caching



A CDN Architecture



Source: Cisco, Guillaume Gottardi, Next Generation Service Edge Architectures, CiscoLive London 2012



Alternative CDN Content Distribution

- Content Classification

- Content manager assesses content popularity.
- Content manager drives content distribution.
 - Popular Content is pre-positioned on the edge.
 - Less Popular content is dynamically cached from central site.
 - Unpopular content is off-loaded directly to Origin.
- Content popularity may change!

- Peer to peer

- Distributed Hash Table model.
- Content can be cached anywhere.
- Appropriate in fully meshed topologies.

