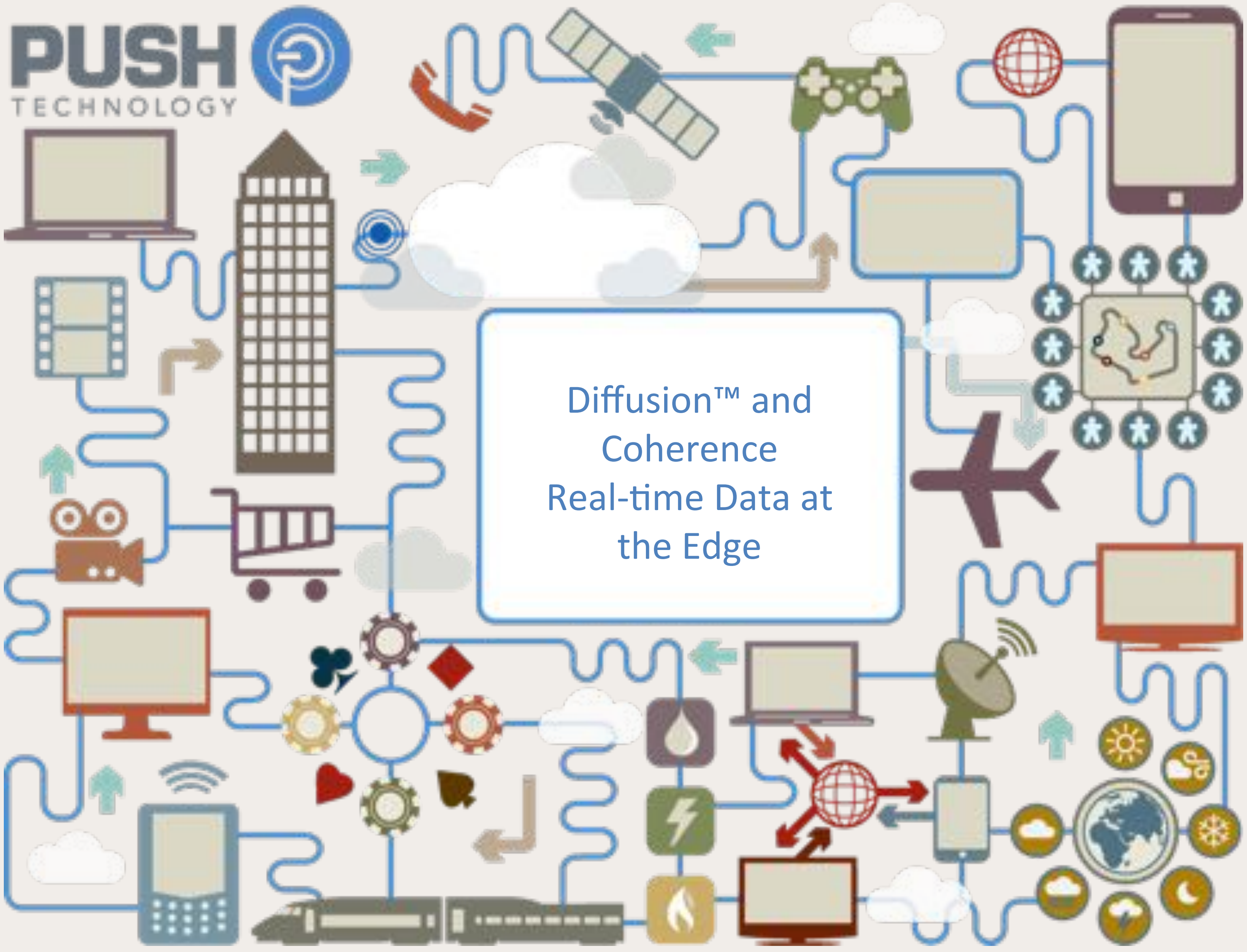

Diffusion™ and Coherence Real-time Data at the Edge

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- Dr Andy Piper
- CTO at Push Technology
- Ex-BEA/Oracle
  - Architect for WebLogic Server Core
  - Architect and then Engineering Director for Oracle Event Processing
- Spring contributor and Author
- Contributed to many standards – OMG, JCP, OSGi Alliance
- PhD, Cambridge, Distributed Systems
- MBA, Warwick Business School

About me?

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andy@pushtechnology.com

Introductions

Phil Aston

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Technical Director, Byng Systems

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Harvey Flather

VP Alliances EMEA, Push Technology

(hflather@pushtechnology.com)

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Diffusion™

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What we do

Software that enables rich real-time user experiences, where the **Right Content** is delivered to the **Right User**, at the **Right Time**, on any device, platform or application, regardless of connectivity or location.

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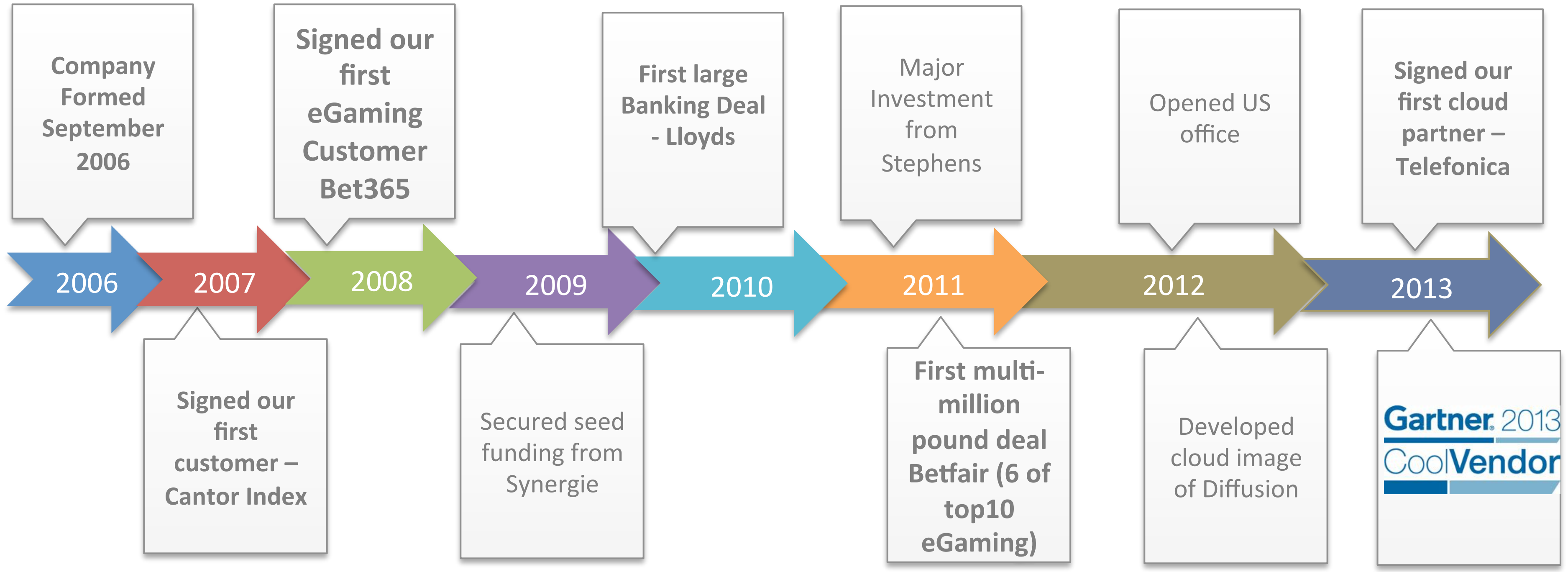
The History of Push Technology


2006
Company Formed September 2006
2007
Signed our first customer – Cantor Index
2008
Signed our first eGaming Customer Bet365
2009
Secured seed funding from Synergie
2010
First large Banking Deal - Lloyds
2011
Major Investment from Stephens
First multi-million pound deal Betfair (6 of top10 eGaming)
2012
Opened US office
Developed cloud image of Diffusion
2013
Signed our first cloud partner – Telefonica
Gartner 2013 CoolVendor

- ➢ Enterprise grade software
- ➢ Strong management team
- ➢ London, Maidenhead and New York Presence
- ➢ 32 employees
- ➢ Investor funded

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PUSH TECHNOLOGY

Why we do what we do

- Extend enterprise systems to **Internet scale** users
  - –Allow you to focus on functionality
  - –Enable rapid demand-based scaling at low cost ($$$ and tin)
- Extend enterprise systems across **Internet quality networks and platforms**
  - –Mobile internet is often unreliable, slow and expensive
  - –Mobile platforms vary enormously in capabilities
  - –Take the pain out of targeting these environments
- **Transparently support heterogeneous devices**
  - –Smart phone, browser, tablet
  - – *"By 2015, mobile application development projects targeting smartphones and tablets will outnumber native PC projects by a ratio of 4-to-1"* - Gartner
- **Real-time, event driven user interactions** without loss of fidelity
  - –In-play betting, trading etc.

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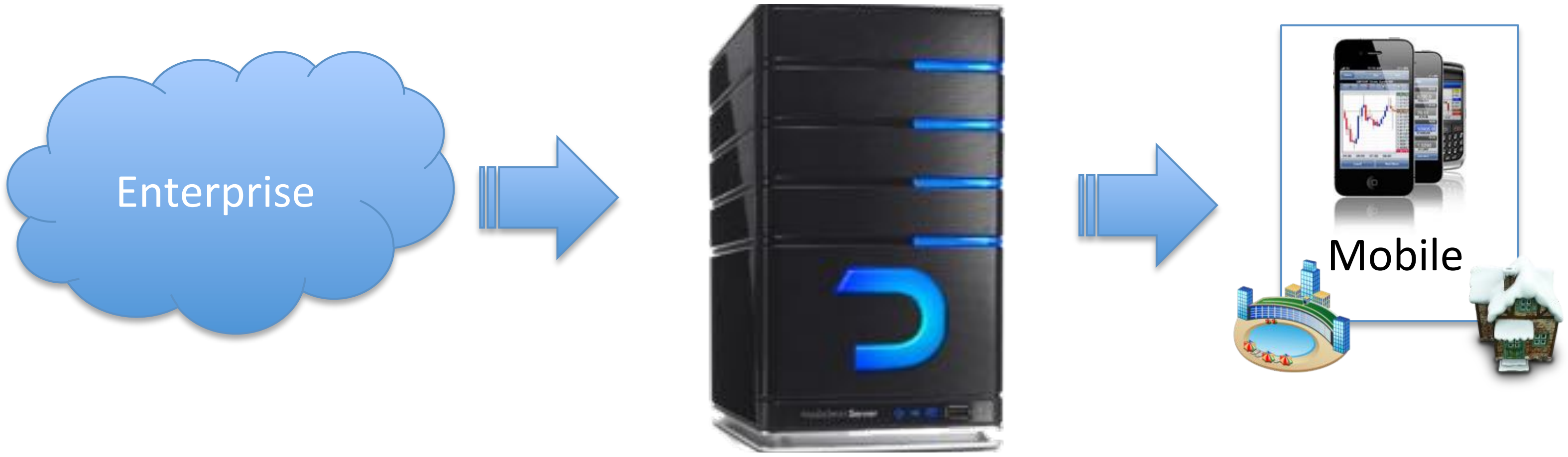
Enter Diffusion™

- Diffusion™ is the glue you are looking for!
- Network-adaptive, client agnostic, edge-facing, real-time, push-based data distribution
  - – Middleware for the event-driven, mobile age



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Diffusion™ Value in a Nutshell

- 100% Java Middleware Fabric
- Messaging to the edge via asynchronous server **push model**
  - **Highly efficient, highly scalable, rapid scale, incredibly fast – rapid ROI**
  - Data and events delivered as they are available for immersive user experience
  - Information can be streamed directly to and from UI elements
- **Network tolerant**
  - Rich, event-driven user experiences regardless of network reliability
- Topic-based publish-subscribe development paradigm
  - Clients and servers communicate via messages published to topics
  - Who gets what highly configurable
- Optimized, "Live data" model layered over messaging
  - **Network optimized - minimization of data reduces network load lowering costs**
  - **More than messaging** - developers focus on applications rather than messaging
- Client agnostic and platform optimized
  - Got a client? We'll push to it – **protocol cascading** based on target capabilities
  - Target multiple platforms easily reducing time to market

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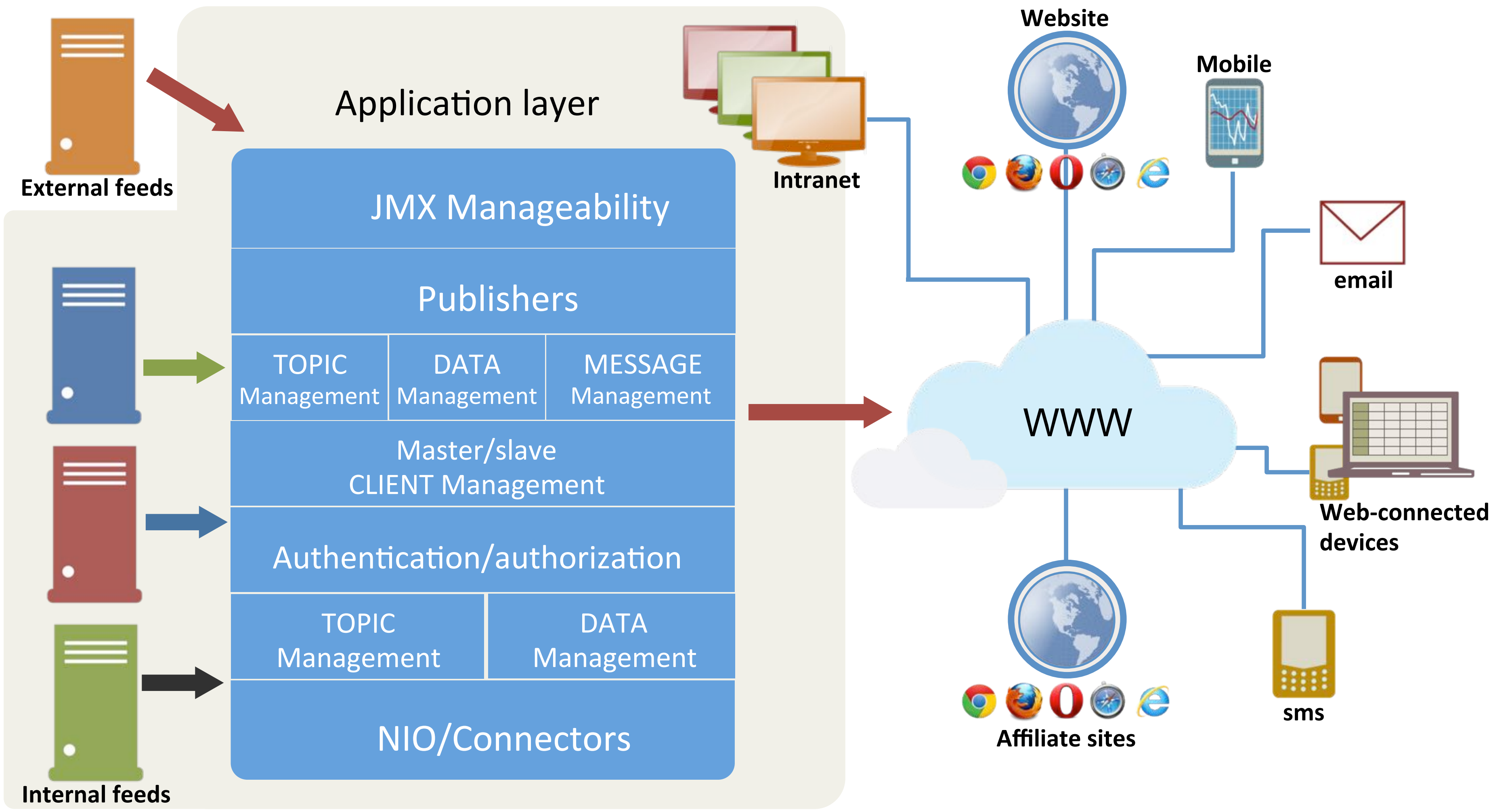
Diffusion™ looks and smells like Middleware



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Diffusion™ Clients

- Simple and consistent APIs across all transports
- To connect to Diffusion from a browser:

```
  <script type="text/javascript"
  src="/lib/DIFFUSION/diffusion.js”/>
<script type="text/javascript">

          DiffusionClient.connect({ topi
          c: "Points", onDataFunction :
          onDataEvent });</script>
```

- All major mobile platforms and client SDKs supported

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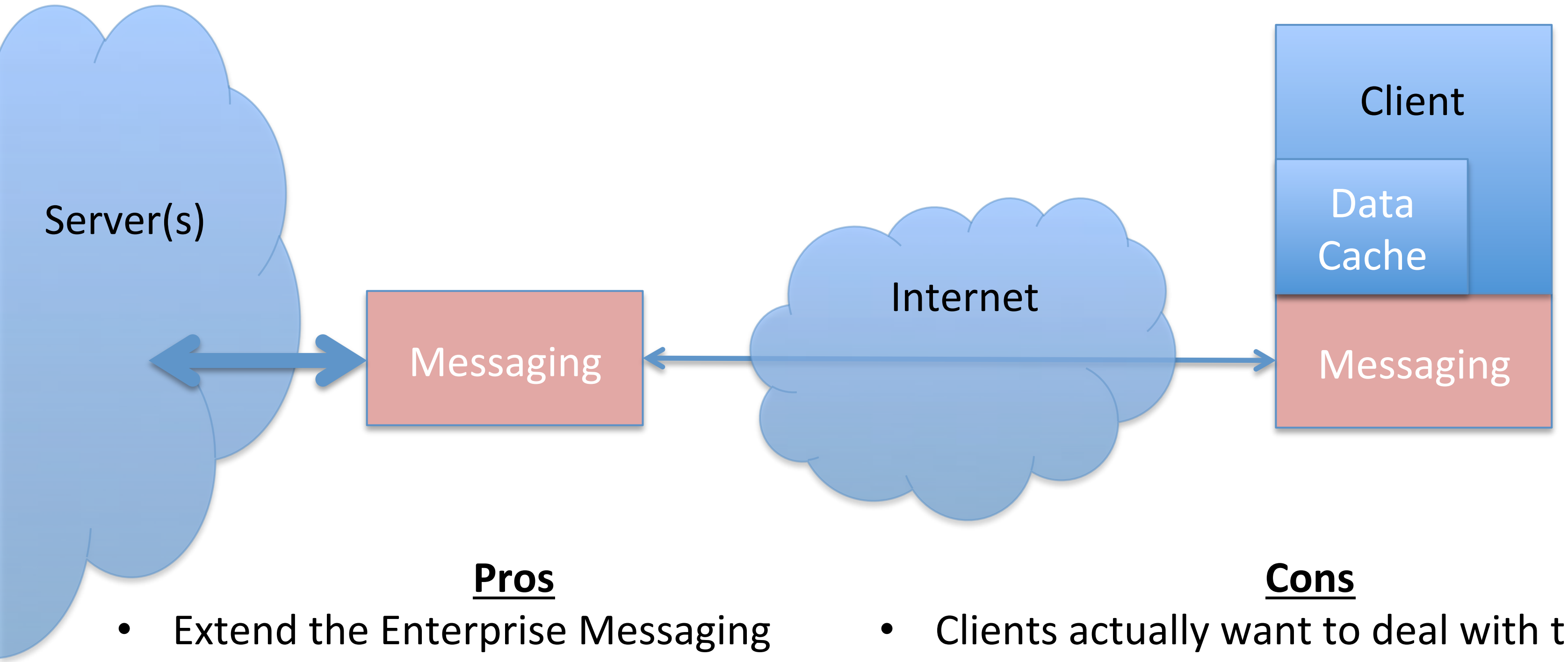
Diffusion™ - How is it Different? Traditional Messaging



Pros

- Extend the Enterprise Messaging paradigm over the Internet
- Familiar Paradigm

Cons

- Clients actually want to deal with the *Data*
- Data Model is opaque
- Few optimization opportunities

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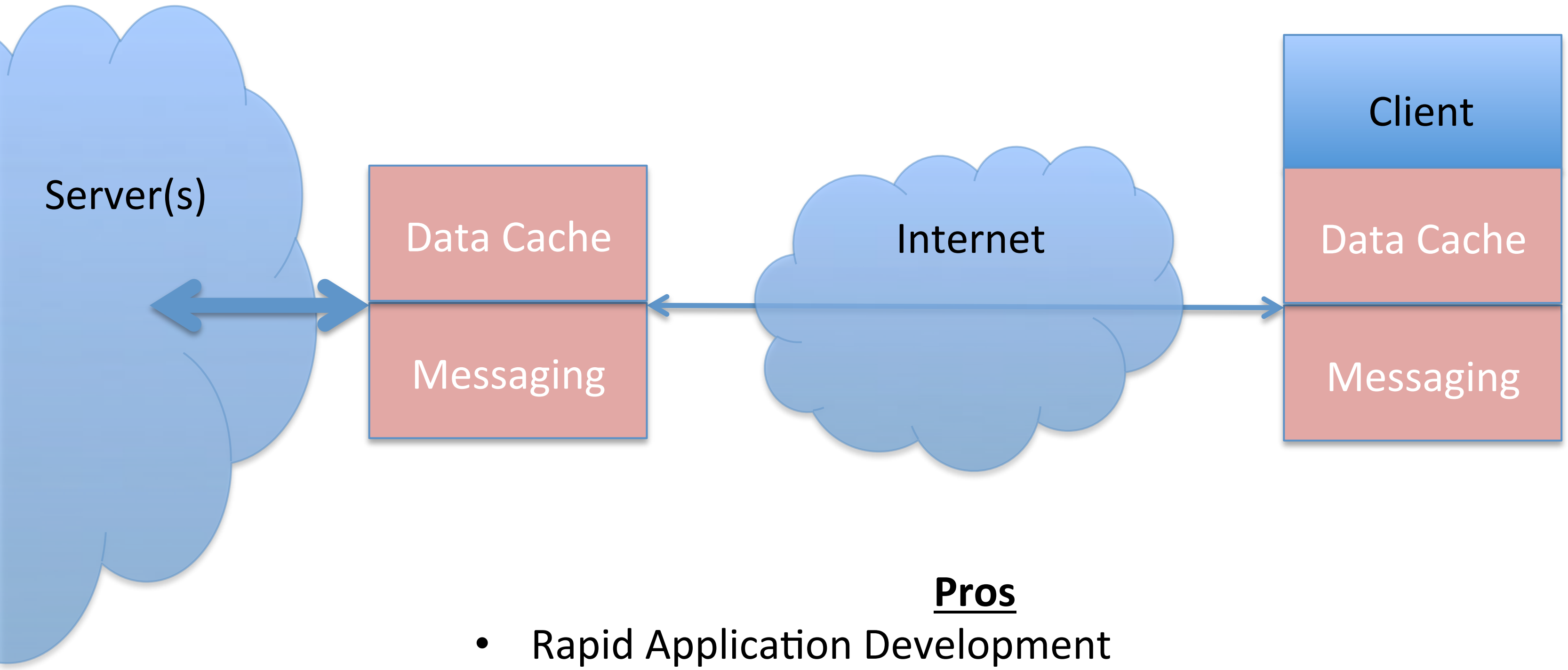
Diffusion™ - How is it Different?
"Live Data" Projection



<u>Pros</u>

- Rapid Application Development
- Optimization opportunities
  - Snapshot - Delta
  - Message merging and removal - "Conflation"

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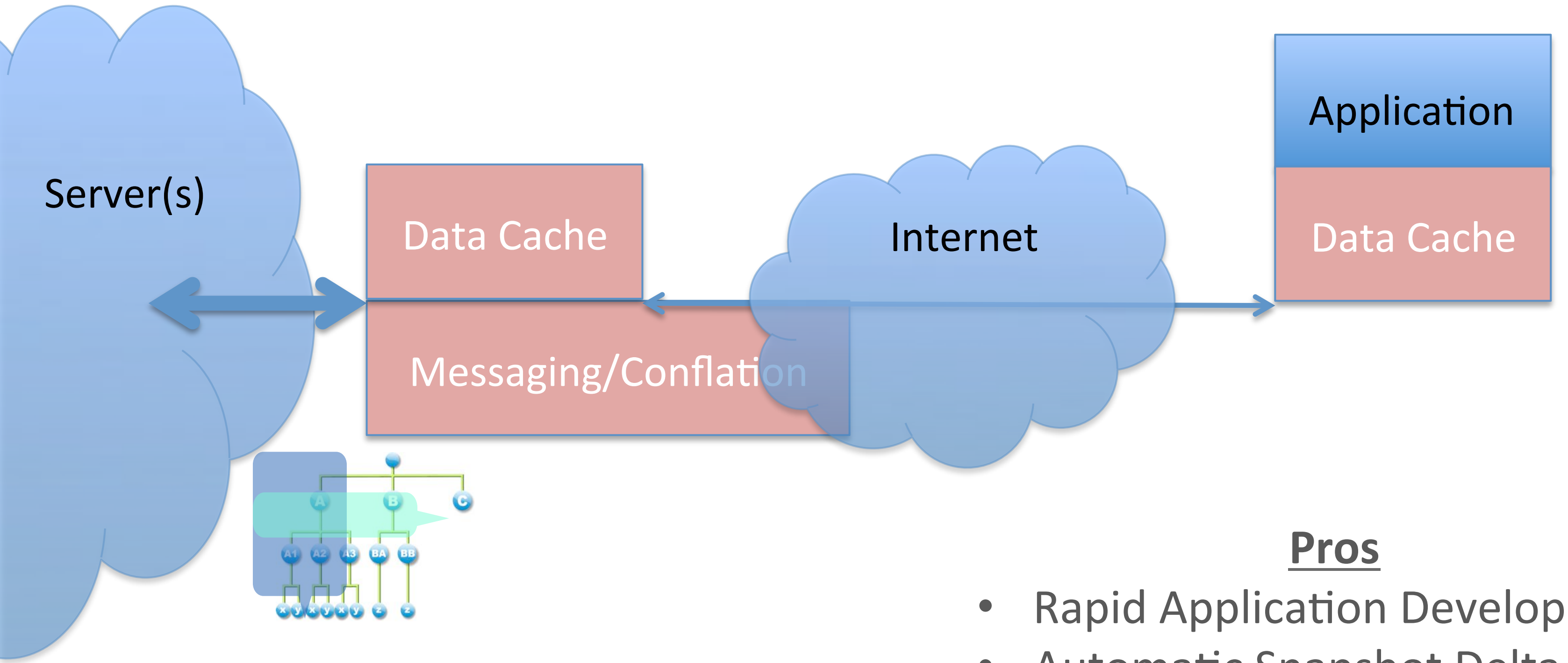
Diffusion™ - How is it Different? Virtualized Queuing



Pros

- Rapid Application Development
- Automatic Snapshot Delta
- Automatic Intelligent Conflation
- Network adaptive
- Topic-based control

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Diffusion™ "Conflation"

- The transmission of deltas and virtualized queues create opportunities
- Deltas represent state changes
- Virtualized queues mean the server can see pending deltas
- Pending deltas can be coalesced without loss of fidelity
  - "Conflation"
- Simple conflation – removes messages that are the same but older
- Structural conflation – merge individual fields between messages
  - Patent pending
- Clients benefit from automatic throttling *without* loss of data

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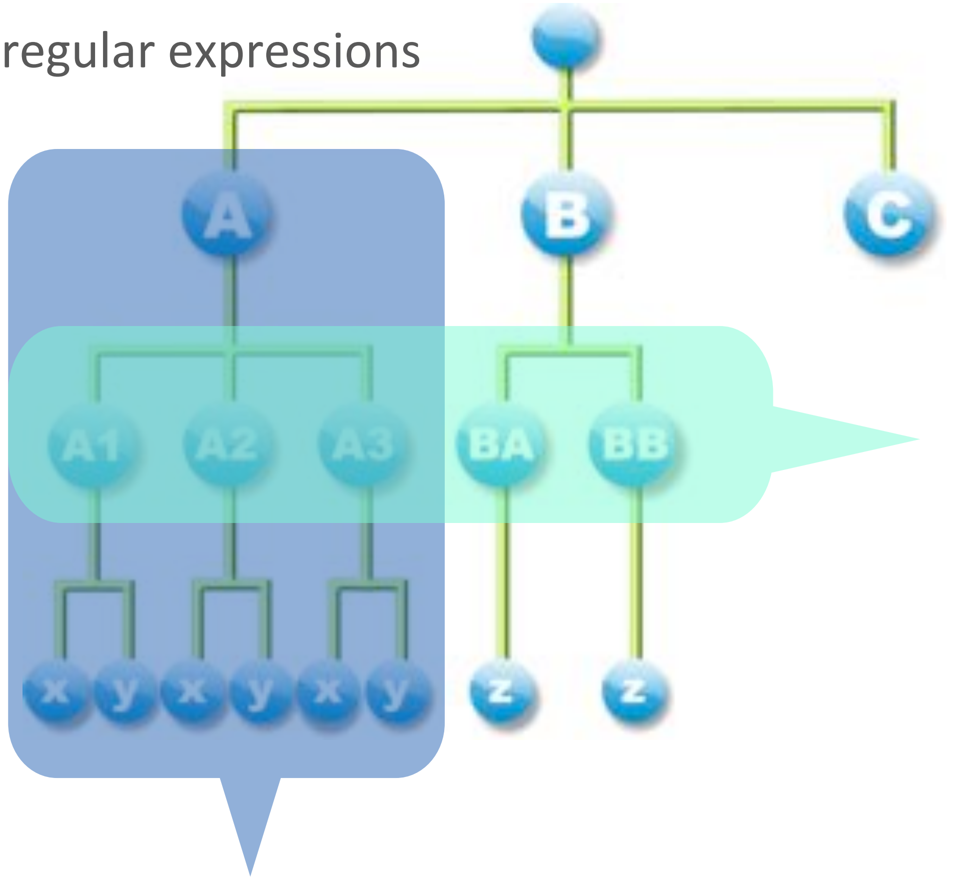
Diffusion™ Messaging Model Publish/Subscribe

- Topics organized as a tree
- Clients can filter hierarchically via regular expressions
- Messages can be published at any level
- Clients and servers can both publish and subscribe
- Servers publish/subscribe via Publisher API
- Clients receive messages via callbacks



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Diffusion and Coherence

- Diffusion exposes a dynamic data model at the edge via messaging
- Coherence presents a dynamic data model in the enterprise
- If you want to extend Coherence to the edge
  - Use Diffusion
- How?
  - Map Coherence MapListener events to outbound Diffusion Topic updates
  - Map Diffusion subscriptions to cache meta data
  - Map inbound Topic updates to cache updates

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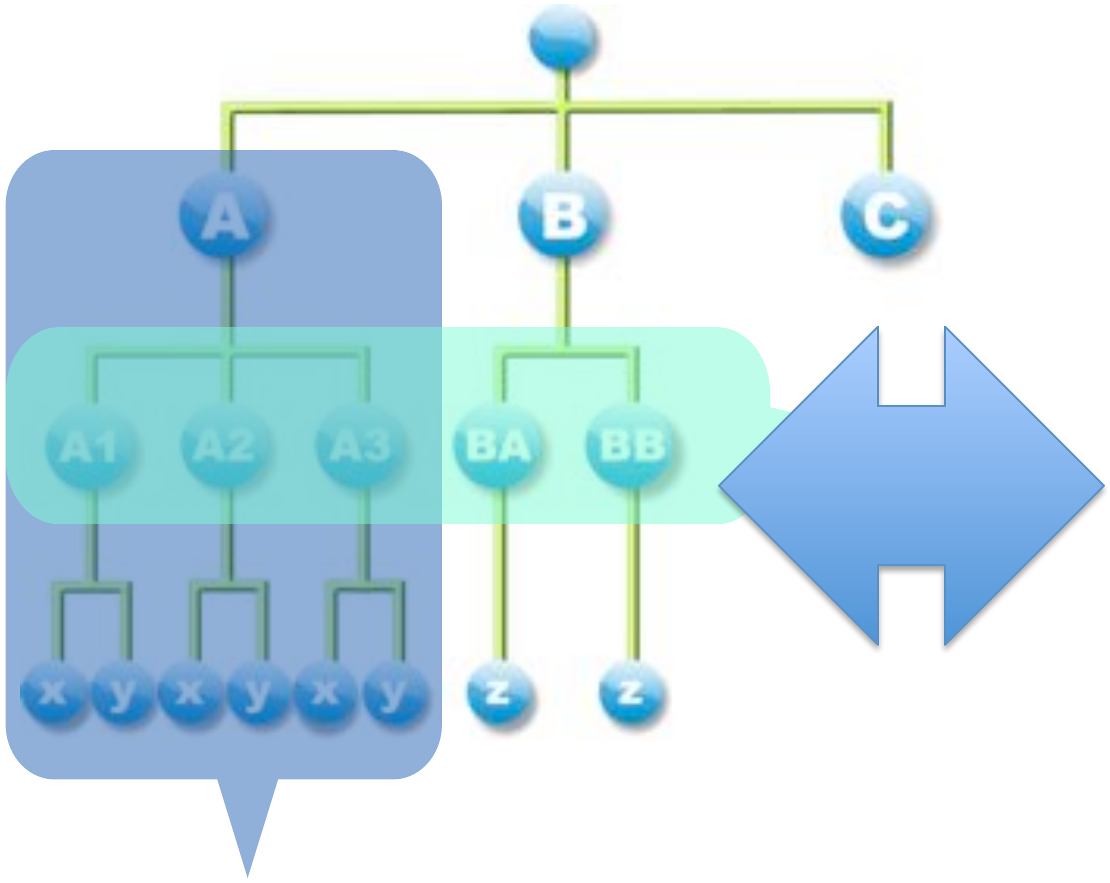
Map Diffusion™ Topics into Coherence Caches



Key	Value
A1	AAAA
A2	BBBBB
A3	CCC
BA	DDD
BB	EEEE

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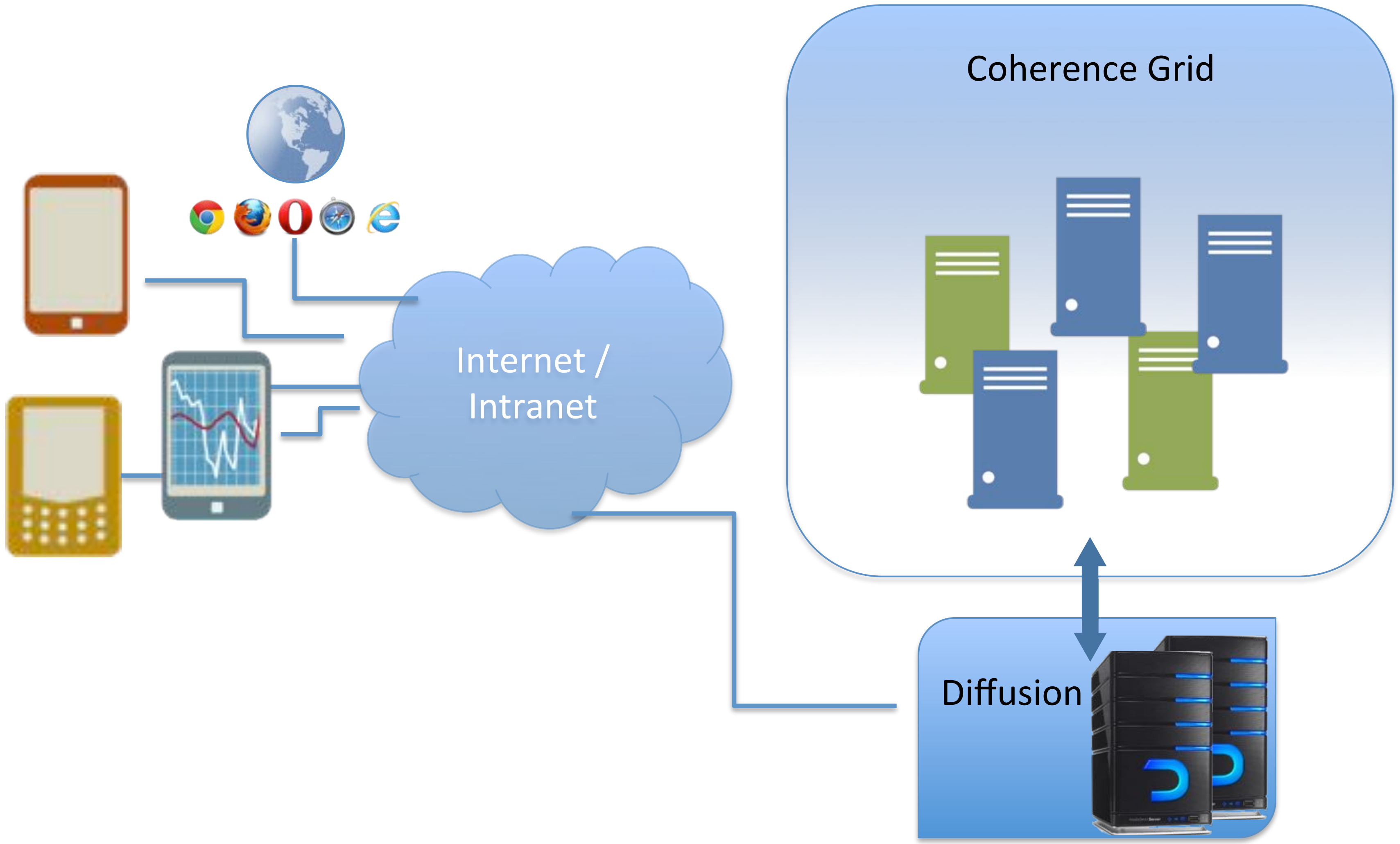
Integrate Diffusion™ into a Coherence Grid



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Diffusion™ Adding Value to Coherence

- Coherence optimized for the demands of the datacentre
- Diffusion optimized for the demands of the mobile internet
- Diffusion only pushes
  - The data you need
  - At the rate that you can absorb it
  - Without getting stale
  - Regardless of when you joined
  - To thousands of clients
- Increases reach of Coherence
- Reduces the load on Coherence

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Coherence Adding Value to Diffusion™

- Diffusion manages state
  - In particular topic state for topic loads
- Coherence can make that state recoverable
  - Store the state in Coherence rather than in Diffusion

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Diffusion™ Performance

6,000,000 messages/second

45,000 clients

Sub 100µs

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Summary of ‘Diffusion’ Key Features

‘Diffusion speeds up the delivery of content and enables rapid scaling by optimising data sent and received’

Fast:	Send initial topic page (snapshot) and then deltas of change
Scalable:	Allows high throughput and scalability on commodity hardware
Intelligent:	Adaptive to bandwidth, device, network, geography
Optimise:	Low bandwidth requirement due to protocol efficiency
Interactive:	Real time ‘Bi-directional’ interactions
Any Device:	Streaming support for all Desktop, Mobile and Web Apps

Right-Data, Right-Place, Right-Time

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Demo

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Demo Scenario

- Foreign Exchange Trading
- Spot prices published continuously
- Client can subscribe to Spot prices
- Client can modify/reset spread and skew

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Demo Design

- Publish prices into Coherence via Coherence client
- Diffusion listens to Coherence MapListener events and updates using Google Protocol Buffers
- Transparently map Protocol Buffers to JSON for JavaScript consumption on a different topic set
- Consume and control output via JSON topics

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Futures

- Interceptor-based implementation
- Transparent pof to Json / GPB maping
- Auto-mapping between cache and Topic data for automatic delta and conflation support

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