Kevin Dillon/Monique Morrow

IPSF Chair and Vice Chair

IPsphere FORUM

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Mark Williams, Apricot 2007

Agenda

- Service provider priorities – IPsphere design goals
- IPsphere terminology primer
- IPSF operating assumptions
- Overview of IPsphere Framework functional components
- IPSF organization & milestones

Service Provider Situation Analysis

Yesterday

Consumer $$ engine = Voice

Business $$ engine = inter-office carriage

Scarce bandwidth = Time, distance, capacity-based charging

Vertical integration = Service specific facilities & practices

Transformation

Support ongoing legacy service revenues

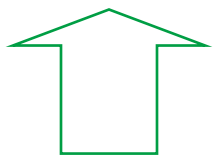
Transition to more flexible lower cost infrastructure

Proliferate broadband as platform for growth services

Enable service elements to be contributed from variety of (internal & external) groups

Support multi-technology, multi-vendor resources

Address, pre-empt public policy



Tomorrow

Consumer $$ engine = Content

Business $$ engine = SaaS, hosting, managed services

Bandwidth not a limit = Charge for higher level resources

Resources “any-sourced” = Service agile facilities & practices

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Relative priorities weighted according to specific provider circumstances

Desired outcomes

- Vibrant non-voice revenue lines
  - For consumers, this means some form of content delivery, which raises the question of how to involve other stakeholders without NSP getting arbitraged
  - For businesses, this means moving up the chain to some mix of hosted applications, processing, storage, security, managed services
- Adequately controlled costs
  - Reduce operations cost without reducing premium touch
  - Access assets in place to cover the full range of credible services to the customer to reduce provisioning on a custom basis
  - Accelerated service ordering/creation through automation ensures market changes can be responded to without losing efficiency
- Optimized infrastructure
  - Every market is an ecosystem into which communications has to fit into and develop in a natural direction
  - Optimum technology choices are made based on ROI projections out of that process
  - Investment timing and market timing are (will always be) linked - how much control can be exercised over the latter?

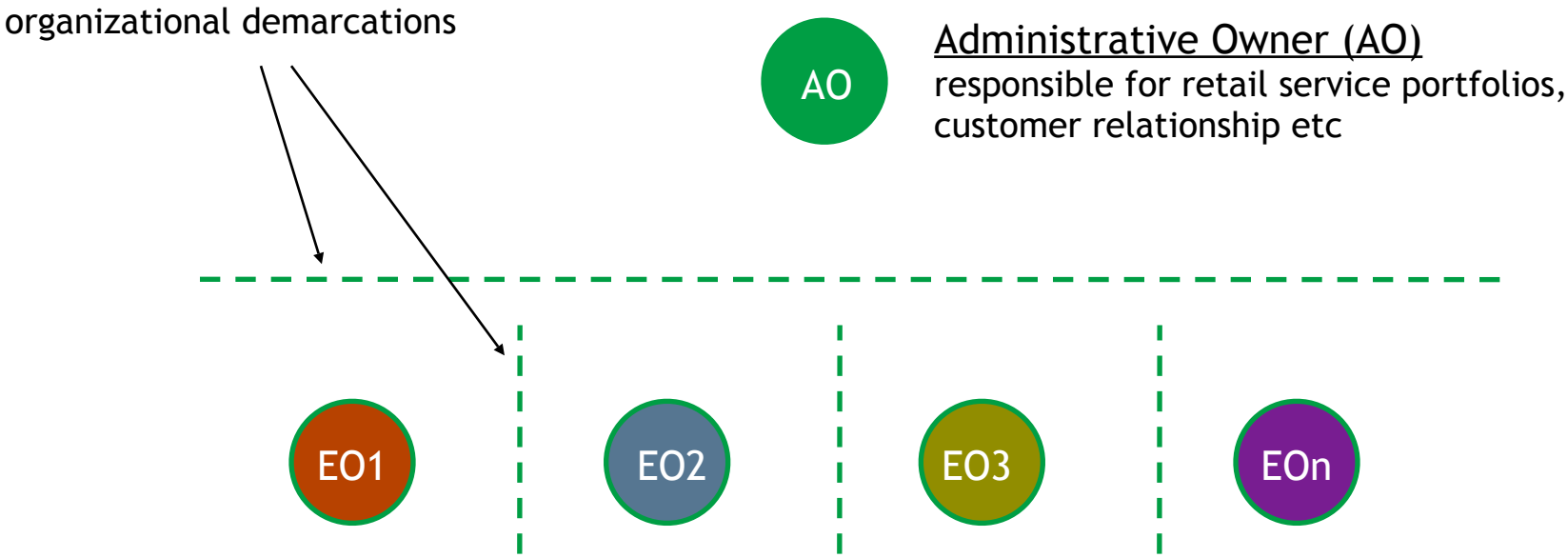
Unprecedented Flexibility

- Optical, Ethernet & IP can support almost any customer-facing service
- But the conception of service most often supported today reflects
  - Vertically integrated
  - Single-provider
  - Single-technology
- Flexibility demands service conceptualization without such limitations
- IPsphere framework
  - Business-based service descriptions represent “external” offerings
  - Translate descriptions to a set of resource behaviors that fulfill the functional requirements of those external service offerings
  - Resources behaviors can
    - Represent both traditional network and IT service elements
    - Be contained completely within a single provider
    - Extend across provider boundaries
    - Single- or multi-technology
    - Single- or multi-vendor

Design Goals

- Recognition of distinct roles & associated jurisdictions
- Compositing of any external service into constituent elements
- Representation and harmonization of business imperatives of both service owner and contributing resource owners
- Framework itself forms an agreed standard, leveraging & working with other standardized systems as required
- Automated to largest practical degree
- Scalability, Reliability, Security & other robustness qualities

Roles & Jurisdictions



Element Owners (EO)
responsible for design, installation, maintenance of enabling technology resources

To reflect real world control/ownership structures
- Many different entities may perform resource owner role
- Nesting of EOs supported as required

Composition and decomposition

Template representing external Service & its constituent Elements

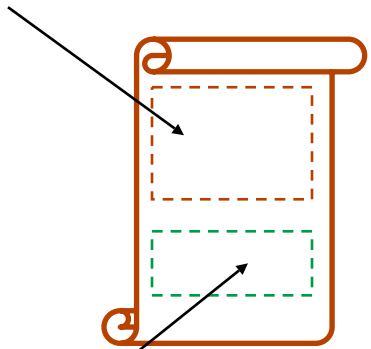
Template-based abstraction ensures:
- Any service, any resource behavior can be represented
- Inherent capability to support blending of different technologies, multi-vendor resources to enable a service

Templates representing resource behavior of sets of technology resources

Enables separation of functionalities to be readily designed and implemented in order to pre-empt or respond to public policy & regulatory imperatives

Sovereignty & Harmonization of EO-AO business imperatives

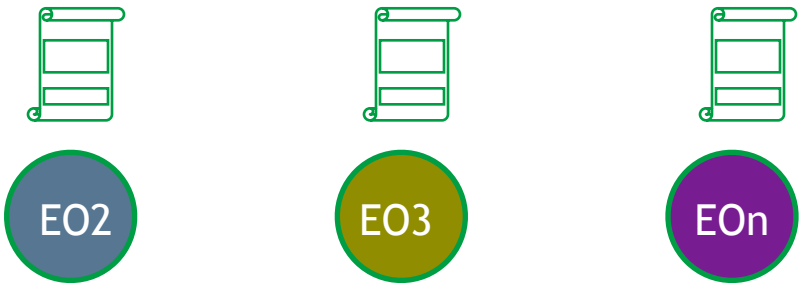
Fields describing Element's technical behavior;
Likely to be the same for many partners



AO

In composing a Service, AO selects Elements based on the technical behavior, and – where relevant - upon the commercial terms offered to AO by the EO

Commercial terms are never exposed publicly



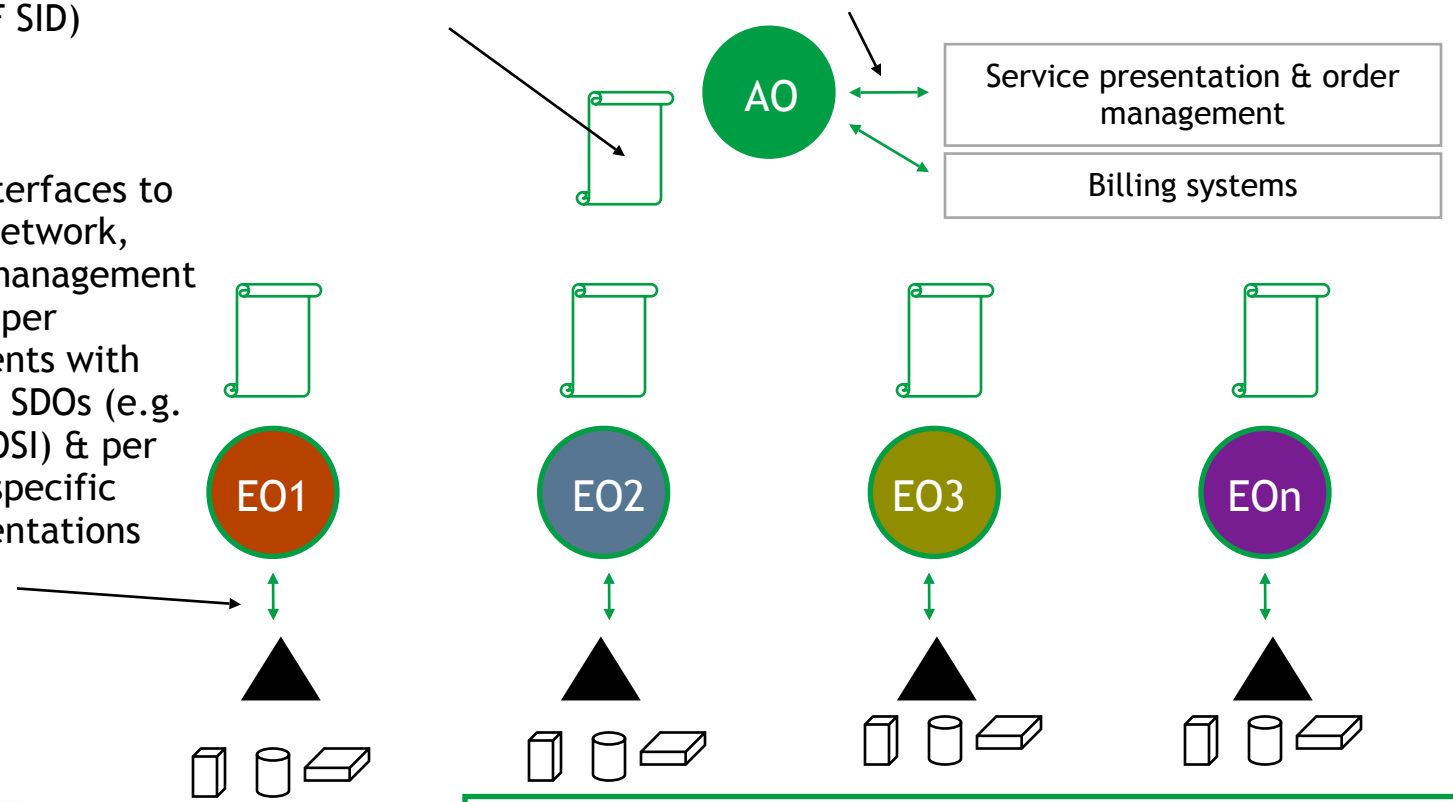
Optional fields describing the commercial terms under which the Element is offered by EO to given AO(s);
Likely to be different in order to reflect bilateral or multi-lateral commercial agreements between the EO and specific AOs

Agreed open standard for framework, and to related functions

Template fields anticipated to leverage industry standard information models (e.g TMF SID)

Clear interfaces to OSS, BSS systems & process maps per agreements with relevant SDOs (e.g. ITU NGN OSS, TMF eTOM)

Clear interfaces to policy, network, device management systems per agreements with relevant SDOs (e.g. TMF MTOSI) & per vendor-specific implementations



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Framework itself forms an agreed standard open to implementation by any company
Clear, well understood interfaces to critical business functions, technology management systems & related sub-systems such as IMS

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Some IPsphere Terminology

- Service
  - Composite of Elements acting as a complete service in its own right
  - Presented to, and ordered/requested by external customers
- Element
  - Contributed piece of wholesale functionality which can be combined with other pieces of wholesale functionality to create a (retail) Service
  - No structural boundary to what might be included in an element
  - Defining factor; Element offered as a piece of composable functionality
  - Represents & maps to an arbitrary set of hardware or software resources
- Resource
  - Network &/or IT assets whose behavior is represented by an Element
  - Controlled by xMS in the IPsphere framework

Some more IPsphere Terminology

- Administrative Owner (AO)
  - Provider responsible for retail Service
  - Owns commercial relationship with service customer
  - Assembles overall retail Service from multiple Element offers
- Element Owner (EO)
  - Provider contributing Elements for AO use in overall retail Service
  - May/may not be responsible for resources enabling an Element
- xMS
  - Policy MS, Network MS, Element MS controlling physical resources
- Architected External Environment (AEE)
  - Activates an IPsphere process from outside IPsphere
- SMS
  - Service Management System
- SSS
  - Service Structuring Stratum
- Template
  - Model & Instance
  - Types of possible data

Scale, Applicability Assumptions

- Functional structure, flows must scale massively
  - Many Services
  - Many provider jurisdictions
  - Many elements available to select from, etc.
- Minimize repetitive exchange of full verbose templates
  - Design for only fields actually required to be in inter-object flows
- Service structuring framework applied intra- & pan-provider
  - Large, incumbents more likely to apply it intra-provider
  - Smaller, niche providers more likely to apply it pan-provider

Customer – AO – EO interaction Assumptions

- Customer & order management is external to IPsphere framework
  - Retail customer always engages via AO, never interacts directly with EO
  - Presentation of retail services to prospective customers is out-of-scope
  - Handling of retail customer service requests is out-of-scope
- IPsphere templates are never exposed to the service customer
  - Other AO processes derive presentation details from IPsphere Service template
  - Other AO processes derive info required from customer from Service template
- A provider can perform AO & EO roles concurrently
  - Offering both retail Services and wholesale Elements at same time
  - Elements can be published both intra- & pan-provider

“Pre-Architecting” Assumptions

- All presented Services, offered Elements are architected pre-order
  - SPC indicated no interest in automating solicitation of custom offers
    - Out-of –scope: customer solicitation of AO to seek un-presented custom Services
    - Out-of-scope: AO solicitation of an EO to seek un-published custom Elements
  - AO, EO are therefore always taking a “proactive” stance

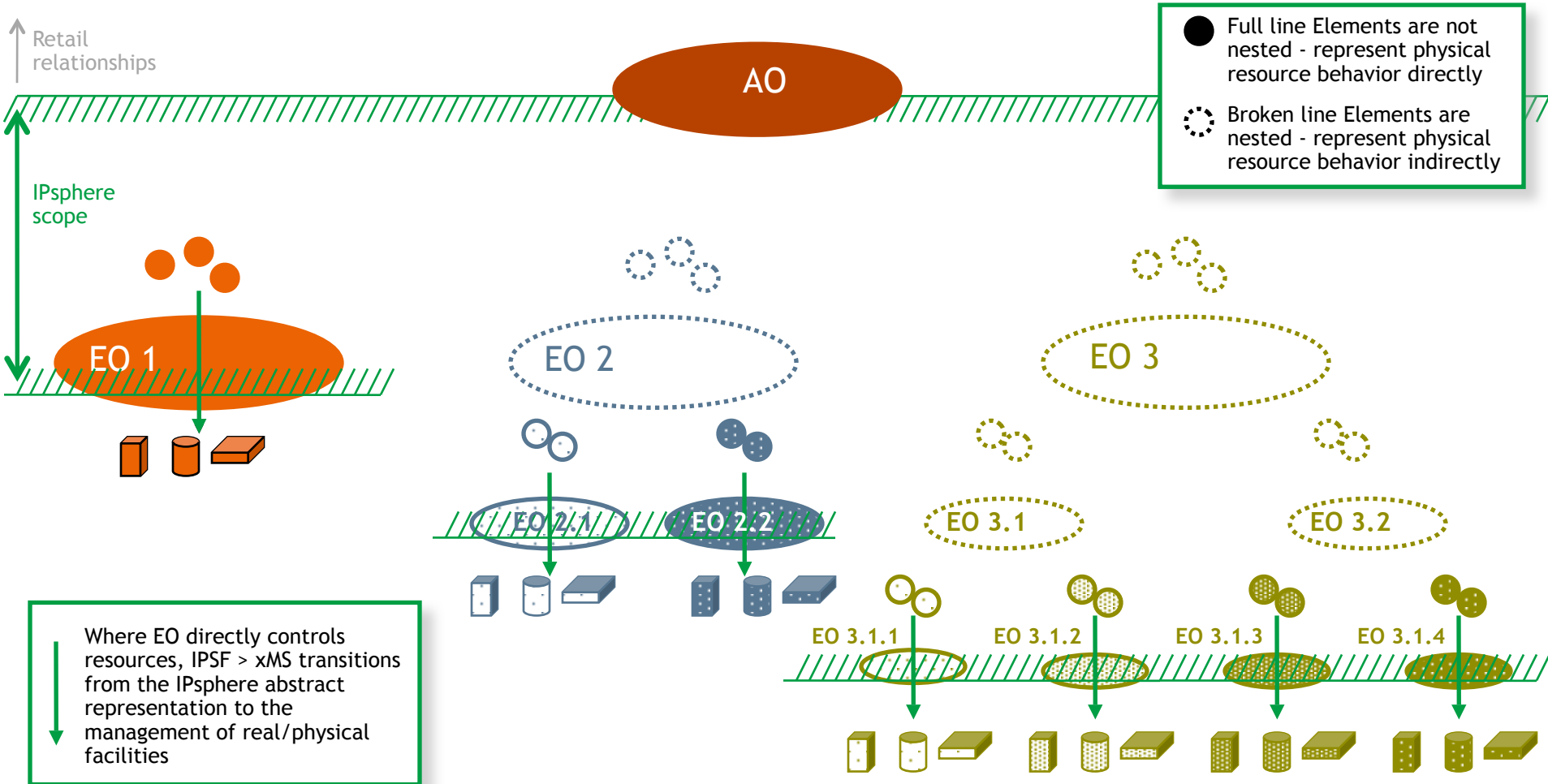
- Possible for AO, EO to take “reactive” approach (via non-IPSF means)
  - Retail AO could “solicit” custom Elements from partner EOs
    - e.g. content providers soliciting specific, customized A/P from access NSP
  - If a solicitation is made & positively responded to
    - Publication of the resulting custom Element(s) would be IPsphere in-scope
    - Custom Element should be visible ONLY to the original solicitor

Billing, Physical Resource Assumptions

- Billing arrangements are external to IPsphere framework
  - AO & EO capture any/all relevant events in log
  - AO derivation of customer billing from event log is out-of-scope
  - EO derivation of partner settlement from log also out-of-scope
  - Further work underway to confirm scope & IPsphere roles here

- Exercising of resources is external to IPsphere framework
  - EO 'owns' resources associated with fulfillment of Element offers
  - Upon Element invocation EO exercises xMS to commit resources
  - Extension topic: IPSF > xMS interfacing
    - May be openly specified by a standard, or
    - Privately codified by an equipment vendor
    - Dedicated workshop topic, Oct 30-Nov 1, 2006

EO & Element Nesting Assumptions



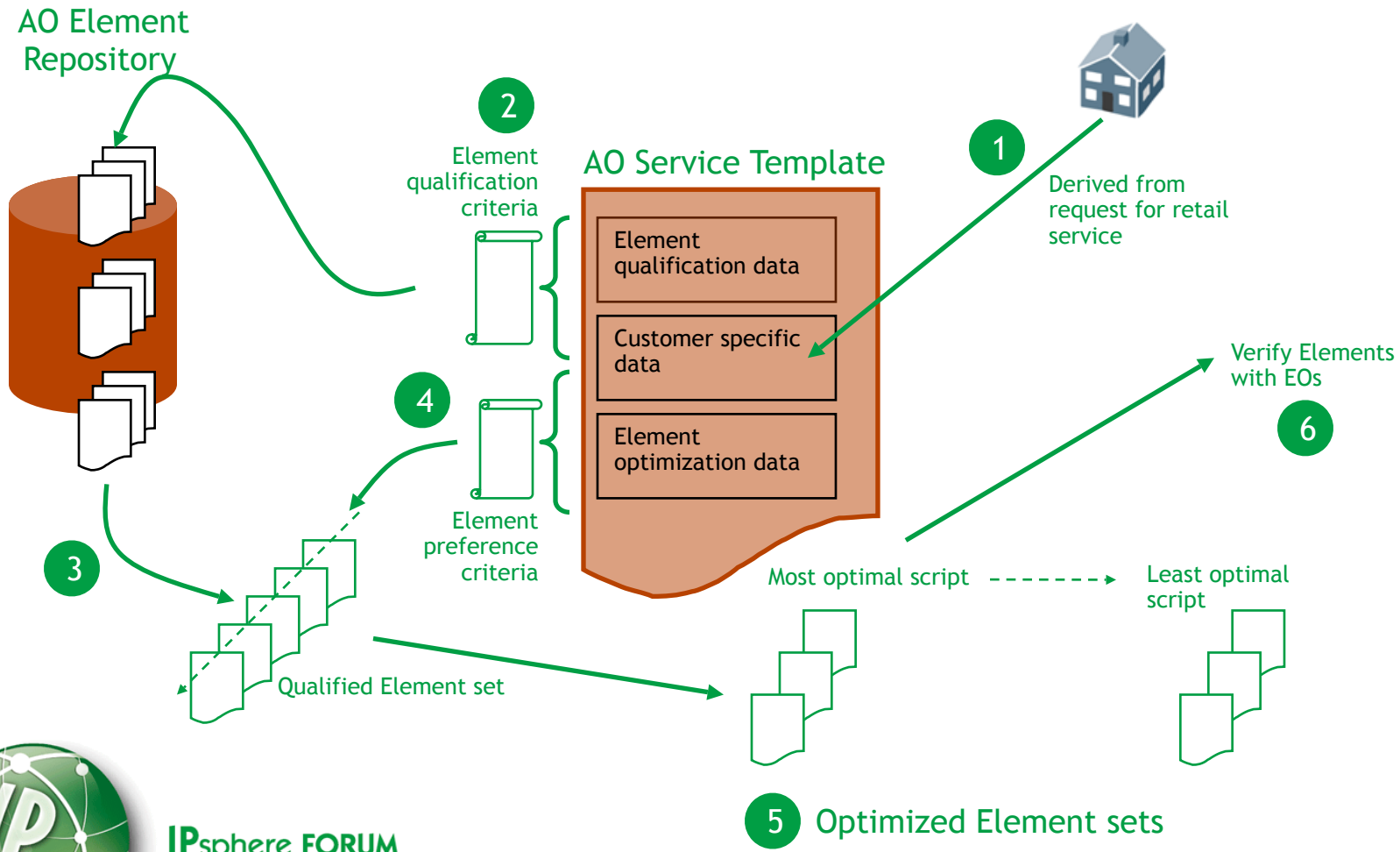
Element Publishing, Visibility Assumptions

- EOs publish and/or update Elements relatively infrequently
  - Publishing, database mechanisms not yet specified by IPSF
    - E.g. WS-Notification
    - Topical contribution: ipsf2005.150
  - Element publication is out-of-band – assumed not to traverse SSS
- Elements are selectively visible to specific AO, or groupings of AOs
  - According to EO-AO commercial relationships
- Each AO establishes comprehensive repository of Elements it has visibility of
  - Complete list of all Elements various EOs are willing to offer to this AO
  - Repository mechanisms not yet specified by IPSF
- 2 potential approaches to AO Element repositories
  - Distributed registry; e.g. a WS that appears as a directory
    - Each provider looks after its own autonomous portion of the distributed system
    - Federation of individual EO Element offers is a property of the system
  - Central registry; e.g. directory of Element maintained by third party
    - Would the IPSF consider taking this on?
    - If not IPSF, then which other bodies might maintain registry of IPsphere Elements?

Element Publishing Assumptions cont'd.

- Element exchange for service composition can take place
  - When the Element was made available for the first time
  - Or at the point where a service was actually being created
    - For this, each retail transaction would require Element information be exchanged with all players, and also potentially real-time partner selection
  - Former is assumed
    - Latter violates SPC requirement that SSS exchanges not be in the critical performance path of some high-volume, low-latency tasks
- Authentication of AOs, EOs into registry system is mandatory
- Element publishing includes several extension topics
  - Recommend further RAWG investigation & SPC consideration ASAP

2-step Element selection Assumptions



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Element selection mode Assumptions

- Selection of Elements to fulfill a specific retail service could be carried out
  - Dynamically – Elements selected post a request for service
  - Pre-selected – Elements specified explicitly when service is originally architected
  - Hybrid – some Elements dynamically selected, other Elements pre-selected
- Pre-selection may not imply static, hard-coded Element lists
  - Background process to modify pre-selected Element lists is possible (but unspecified)
  - Sunnyvale consensus was any such background processes are IPSF out-of-scope
- Element selection "mode" for a service is an architect choice, influenced by
  - How often Elements are expected to be contributed (Element refresh rate)
  - Nature of the service – expectation re activation delay (immediate or deferred etc.)
    - Ephemeral consumer services likely use pre-selected
    - Long-lived business services more likely to use dynamic selection
- Element selection and/or architecting "Break-points"
  - Required to enable human intervention, over-riding
- IPsphere will permit "Dynamic", "Pre-configured" & "Hybrid"
  - Per Sunnyvale workshop consensus
  - Implementers free to chose between or for all of these modes
- Extension topic: Element selection in active phase of a service
  - In-service Element selection & Service recombination
  - Potential for dedicated workshop

Element activation sequencing Assumptions

- Ensure that no Element proceeds to Execute before all elements have successfully Setup
- Same applies between Execute and Assure
- Avoids AO potentially incurring costs prematurely
- Also avoids exiting of Setup, Execute phases until all Elements attain same effective state

Assure Phase Alerts, Monitoring, Maintenance Assumptions

- Assurance at the Service level is responsibility of its AO
- In-service (IPsphere Assure Phase) Alert handling
  - By definition no faults that aren't detectable at the Element level
  - Must correlate Element faults to consequent AO Service impacts
  - Sunnyvale consensus - IPsphere can & should have this property
  - Alert handling alternatives can be a property of the Element offer
- End-end monitoring can be an Element in its own right
  - C/P Element could be additional cost item
  - Generating Assure Phase Alerts per preset tolerances
- Maintenance windows may be approached in similar fashion
  - Refer also ipsf2006.149 contribution

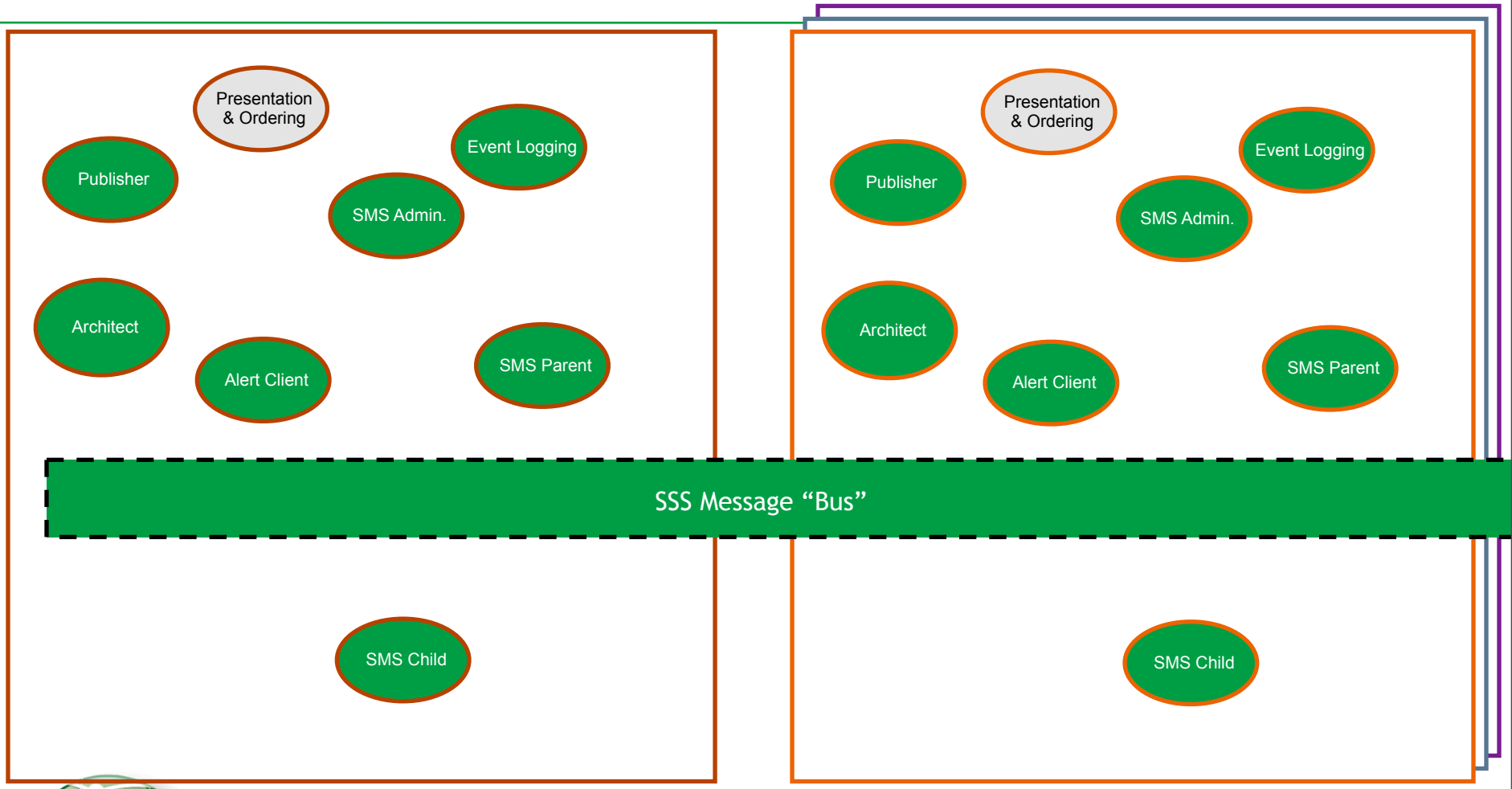
High Level SSS scope Assumptions

- SSS in-band
  - Element verification
  - Element activation & de-activation
  - Element alerts
- Out-of-band to SSS
  - Element publication
  - Synchronization of AO Element repositories
  - Element solicitation (for custom offers)
  - Request from retail customer
  - Billing & settlement
- Extension topic: Authentication of SSS “talkers”
  - SSS must be a trusted environment for AO, EO message exchange
  - Legal liability is a potential approach
    - Bad behavior is protected against by penalties provided for in signing up to SSS
    - Audit capability allows non-repudiation of malicious originator

Decomposed, non-monolithic framework

- Enables providers to chose best-of-breed components
- Lowers barrier to participation > more innovators in IPSF validations, showcases etc.
  - Far fewer implementers would be sufficiently resourced/skilled for entire monolithic framework
- Facilitates integration of IPsphere framework with other software, hardware systems
  - Components that touched outside systems could be selected individually
  - By range of interfaces (& other options) required by specific provider OSS/BSS etc environments
- Facilitates diagnostics in validations, showcases etc, & enables certification in tests
  - Exposes results of the exercising of key functions for monitoring & subsequent inspection
- Allows multiple copies of key functional components to be run on different systems
  - Improving performance, scaling, and redundancy
- Extension topic: tighter coupling of functions
  - Production implementations may desire to couple components more tightly for performance, cost..
  - Potential IPSF objective – specific identified interface points be capable of loose or tight coupling

IPsphere Functional Components



Administrative Owner

Element Owners

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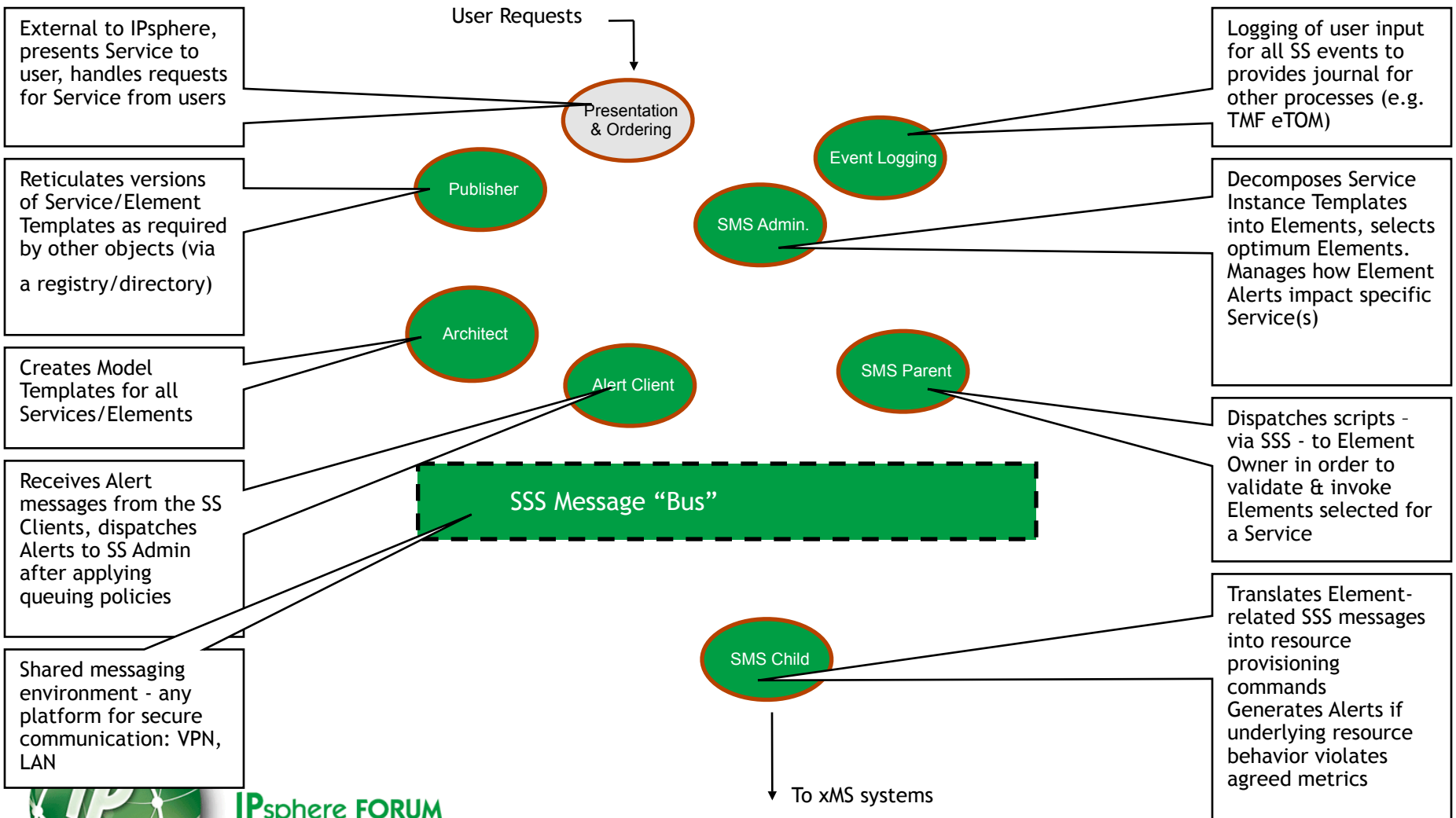
IPsphere Framework Functions



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IPSF organizations & milestones

IPsphere Forum membership

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Plan of Record 2006

	Q1 06	Q2 06	Q3 06	Q4 06
Workshops	IPSF Burbank Feb 13-15 IMS I Paris	IPSF Sophia Antipolis May 15-17 Object Model Sunnyvale PP LSP Montreal	IMS II Ottawa IPSF Oslo Sept 12-14 IMS III Whippany Data Model Sunnyvale	IPSF London Dec 11-13
Publication		IPsphere commercial framework		Release I technical specification
Implementation		Tokyo Showcase		London Validation
Liaisons	ITU-T		OASIS	ETSI

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Anticipated Plan of Record 2007

	Q1 07	Q2 07	Q3 07	Q4 07
Workshops	IPSF NYC Feb 21-23 Interim WS TBD	IPSF Berlin May 8-10 Interim WS TBD	IPSF France Sept 25-27 Interim WS TBD	IPSF China Dec 11-13
Publication		Release 2 technical specification IMS-NGN specification		Release 3 technical specification
Implementation	R&D Platform P1	Public Showcase – Timing TBD	R&D Platform P2	R&D Platform P3
Liaisons	TMF, GSMA, FMCA, ITU-T SG13, OMA		Additional potentials: GGF LAP MSF MFA	

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Thank You