

# In-Network Computing for App-Centric Micro- Services

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# Premise of the Draft

“The application-centric deployment of 'Internet' services has increased over the past ten years with many million applications providing user-centric services, executed on increasingly more powerful smartphones that are supported by Internet-based cloud services in distributed data centres, the latter mainly provided by large scale players such as Google, Amazon and alike. *This draft outlines a vision of evolving those data centres towards executing app-centric micro-services; we dub this evolved data centre as an **AppCentre**.*”

- Draft outlines research challenges and overview of ongoing efforts for relevant technology areas

# Overview of Changes

1	Introduction .....	3
2	Terminology .....	4
3	Use Cases .....	4
4	Requirements .....	4
5	Enabling Technologies .....	5
5.1	Application Packaging .....	5
5.2	Service Deployment .....	7
5.3	Compute Inter-Connection at Layer 2 .....	7
5.4	Service Routing .....	8
5.5	Constraint-based Forwarding Decisions .....	9
5.6	Collective Communication .....	10
5.7	State Synchronization .....	11
5.8	Dynamic Contracts .....	11
6	Overview of Relevant Standardization Efforts .....	11
7	Security Considerations .....	12
8	IANA Considerations .....	12
9	Conclusion .....	12

Just a stub with reference to now integrated use case draft

Changed with linkage to technologies in Section 5

Added more text in a number of sub-sections, particularly in relation to other standardization efforts

Added this new section to link to ongoing SDO efforts

# Requirements

Requirement	Definition
Service Routing	Any app-centric execution environment MUST provide means for routing of service requests between resources in the distributed environment.
Constraint-based Forwarding Decision	Any app-centric execution environment MUST provide means for dynamically choosing the best possible micro-service sequence (i.e., chaining of micro-services) for a given application experience. Means for discovering suitable micro-service SHOULD be provided.
Flow Affinity	Any app-centric execution environment MUST provide means for pinning the execution of a specific micro-service to a specific resource instance in the distributed environment.
Deployment	Any app-centric execution environment SHOULD provide means for packaging micro-services for deployments in distributed networked computing environments. The packaging SHOULD include any constraints regarding the deployment of service instances in specific network locations or compute resources. Such packaging SHOULD conform to existing application deployment models, such as mobile application packaging, TOSCA orchestration templates or tar balls or combinations thereof.
Synchronization	Any app-centric execution environment MUST provide means for real-time synchronization and consistency of distributed application states.
Generic invocation	Any app-centric execution environment MUST provide support for app/micro-service specific invocation protocols.
Collective Communication	Any app-centric execution environment SHOULD utilize Layer 2 multicast transmission capabilities for responses to concurrent service requests.
Orchestration	<p>Any app-specific execution environment SHOULD expose means to specify the requirements for the tenant-specific compute fabric being utilized for the app execution.</p> <p>Any app-specific execution environment SHOULD allow for dynamic integration of compute resources into the compute fabric being utilized for the app execution; those resources include, but are not limited to, end user provided resources.</p> <p>Any app-specific execution environment MUST provide means to optimize the inter-connection of compute resources, including those dynamically added and removed during the provisioning of the tenant-specific compute fabric.</p> <p>Any app-specific execution environment MUST provide means for ensuring availability and usage of resources is accounted for.</p>

# Mapping of Requirements to Standardization Efforts

(Initial List, Not Claiming to be Exhaustive)

Requirements	Efforts
Service Routing	former Routing RG [RRG] Dyncast [DYN-CAST] APN BoF [APN]
Constraint-based Forwarding Decision	Dyncast [DYN-CAST] EIGRP [RFC7868] Alto WG [ALTO] Intent-based Networking [IB_CONC]
Flow Affinity	Dyncast [DYN-CAST]
Deployment	ETSI NFV MANO Intent-based Networking [IB_CONC]
Synchronization	GAIA-X [GAIA-X]
Generic invocation	Internet Services over ICN [ICNIP]
Collective Communication	BIER WG [BIER] Internet Services over ICN [ICNIP] Multicast for HTTP over BIER [BIER-MC]
Orchestration	3GPP 5GLAN [SA2-5GLAN] and ETSI MANO

# Future Plans

- Fill in missing sub-sections for Section 5 (dynamic contracts)
- More clearly link to other COIN drafts in relevant areas, e.g., computing frameworks, programmable forwarding nodes
  - > Mainly for Section 5
- Update Section 5 with more relevant efforts in SDOs
- Update list in Section 6 beyond initial content
- **Adopt as RG draft?**