

Use Cases for In-Network Computing

<https://www.ietf.org/archive/id/draft-irtf-coinrg-use-cases-03.txt>

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Purpose of this draft

COIN Charter, Scope #2:

“Research on use case driven requirements analysis: [..] Identify potential benefits to these networks from in-network functionality [..]”

- **This draft**

- ▶ Collection of *use cases*
- ▶ Structured for *providing insights* into benefits, research questions, and opportunities for COIN

- **Goal**

- ▶ Provide input for scope #2

Use Case Structure

- 3. Providing New COIN Experiences 4
 - 3.1. Mobile Application Offloading 4
 - 3.2. Extended Reality and Immersive Media 10
 - 3.3. Personalized and interactive performing arts 13
- 4. Supporting new COIN Systems 17
 - 4.1. In-Network Control / Time-sensitive applications . . . 17
 - 4.2. Large Volume Applications 20
 - 4.3. Industrial Safety 23
- 5. Improving existing COIN capabilities 25
 - 5.1. Content Delivery Networks 25
 - 5.2. Compute-Fabric-as-a-Service (CFaaS) 27
 - 5.3. Virtual Networks Programming 29
- 6. Enabling new COIN capabilities 33
 - 6.1. Distributed AI 33

Current Status

- **Use case descriptions aligned based on (new) taxonomy**
- **Draft finished from authors' point of view**
- **Next step: RGLC**

Terminology for In-Network Computing

<https://www.ietf.org/archive/id/draft-irtf-coinrg-coin-terminology-00.txt>

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Purpose of this draft

- **Collect COIN-related terminology**
 - ▶ Terminology needed for the use case draft
 - ▶ I-D.draft-kutscher-coinrg-dir-02 expired
- **Moved from use case draft to a dedicated document**
- **Questions to RG**
 - ▶ Who can take over managing the document?
 - ▶ Goal for this document?
 - Living collection of terminology?
 - ▶ Scope of this terminology?
 - ▶ Changes? Additions?

COIN RG Terminology

Programmable Network Devices (PNDs): network devices, such as network interface cards and switches, which are programmable, e.g., using P4 or other languages.

(COIN) Execution Environment: a class of target environments for function execution, for example, a JVM-based execution environment that can run functions represented in JVM byte code

COIN System: the PNDs (and end systems) and their execution environments, together with the communication resources interconnecting them, operated by a single provider or through interactions between multiple providers that jointly offer COIN capabilities

COIN Capability: a feature enabled through the joint processing of computation and communication resources in the network

(COIN) Program: a monolithic functionality that is provided according to the specification for said program and which may be requested by a user. A composite service can be built by orchestrating a combination of monolithic COIN programs.

(COIN) Program Instance: one running instance of a program

COIN Experience: a new user experience brought about through the utilization of COIN capabilities

Use Case Analysis for In-Network Computing

<https://www.ietf.org/archive/id/draft-irtf-coinrg-use-case-analysis-00.txt>

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Purpose of this draft

- **draft-irtf-coinrg-use-cases-03.txt provides use case descriptions**
- **This draft**
 - ▶ Analyze opportunities, research questions and requirements to identify commonalities
 - ▶ Provide general research directions for COIN

- **Current status**

- ▶ Started with research questions
 - Deeper analysis still to do
- ▶ Missing
 - Opportunities
 - Requirements

+-----+ + Applicability Areas + ++ + Transport App Data Routing & (Industrial) + + Design Processing Forwarding Control + +-----+				
+-----+ + Distributed Computing FRAMEWORKS and LANGUAGES to COIN + +-----+				
+-----+ + ENABLING TECHNOLOGIES for COIN + +-----+				
+-----+ + VISION(S) for COIN + +-----+				

Questions to RG

- **Who can take over managing the document?**
- **Who is interested in contributing / doing the analyses?**