# DMS: Dynamic Inter- and Intra-Domain Mobility Support Framework for Information Centric Networking

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# DMS Design Objectives

**Develop a common mobility support framework for ICN to support**:

- Producer and Consumer mobility
- Intra-domain and inter-domain mobility
- Inter-session and intra-session mobility

**Offer performance guarantees** for any mobility scenario beyond the best-effort support

**Offer in-band signaling** to recover fast after handovers

Potential to **offer as an on-demand service** to manage signaling and communication overhead

# DMS Architecture Components

**Mobility Service addresses selective application of mobility support to a subset of flows**

- Mobility service flag within packet header to identify flows
- Naming through use of mobility service prefix appended to content name
- Creating traffic rules and pre-configuring ICN routers to distinguish flows

**Forwarding Label**

- Support for ID/locator split in ICN
- Allow easy path update to guide packet flows towards moving entities
- Introduce Forwarding Label Table (FLT) at ICN routers to handle updates

**Distributed Mobility Controller (DMC)**

- Localized service nodes within domain to handle mobility support for mobile entities
- Introduce Local Registration Database (LDB) to store name to locator mappings based on local (for visiting)/remote (for member) registrations

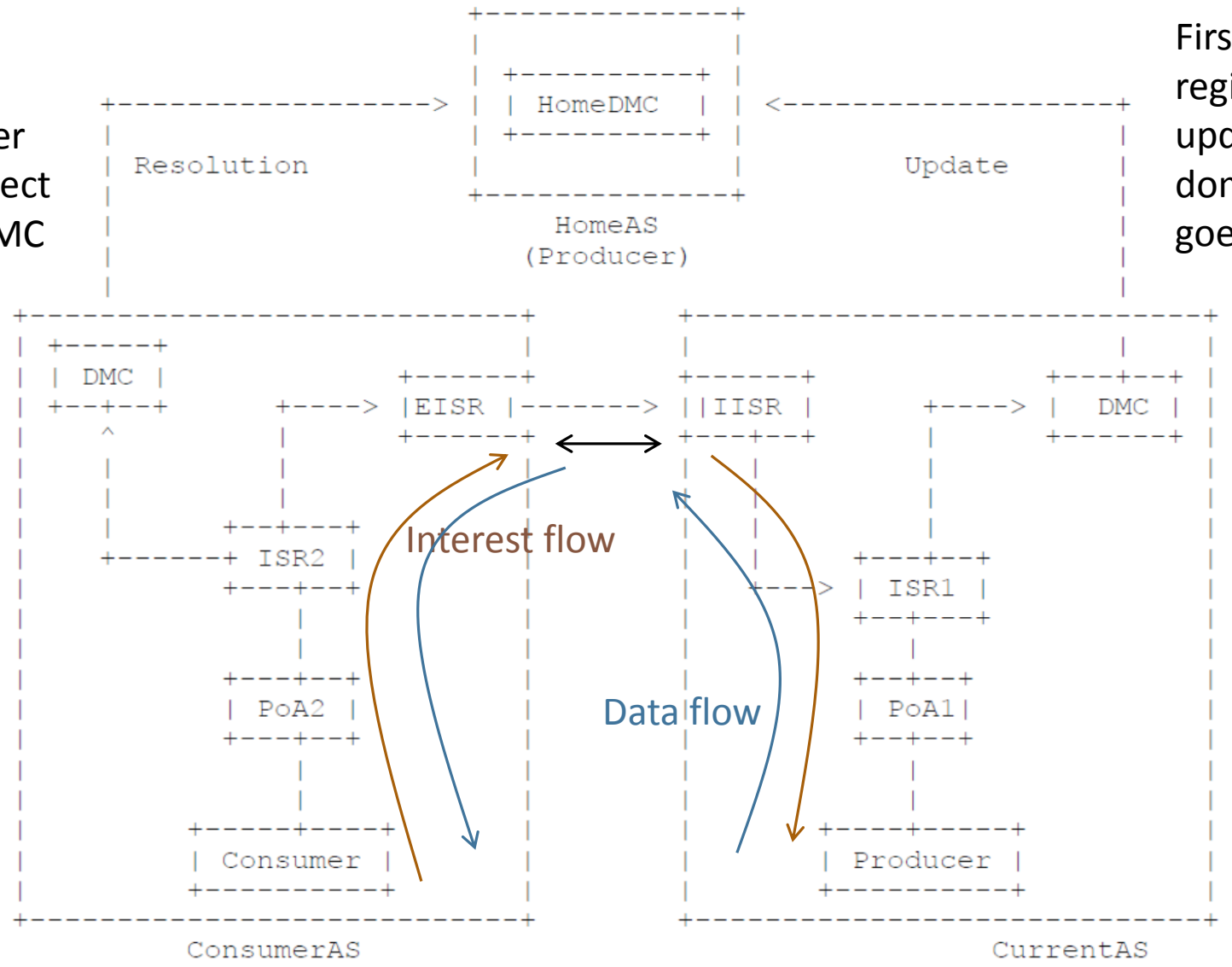
"Seamless Producer Mobility as a Service in Information Centric Networks", A. Azgin, R. Ravindran, A. Chakraborti, and G.Q. Wang, ACM ICN IC5G Workshop, 2016.

"Forwarding Label support in CCN Protocol", R. Ravindran, A. Chakraborti, and A. Azgin, draft-ravi-icnrg-ccn-forwarding-label-02 (work in progress), March 2018.

"A Scalable Mobility-Centric Architecture for Named Data Networking", A. Azgin, R. Ravindran, and G. Q. Wang, IEEE ICCCN Scene Workshop, 2014.

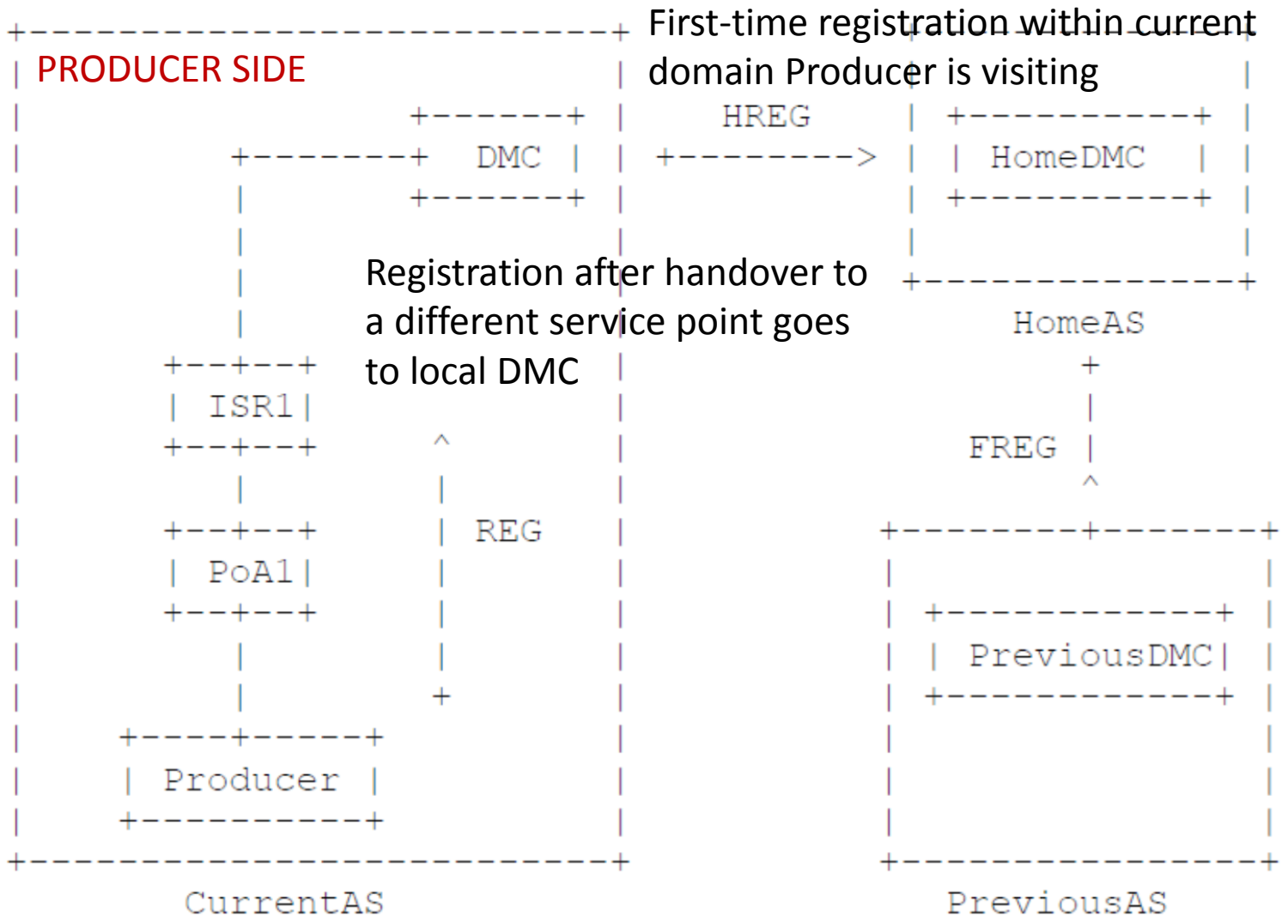
# Example DMS Architecture

First-time resolution or after timeout/disconnect goes to Home DMC




First-time registration or update after inter-domain handover goes to Home DMC

# DMS Implementation – Registration



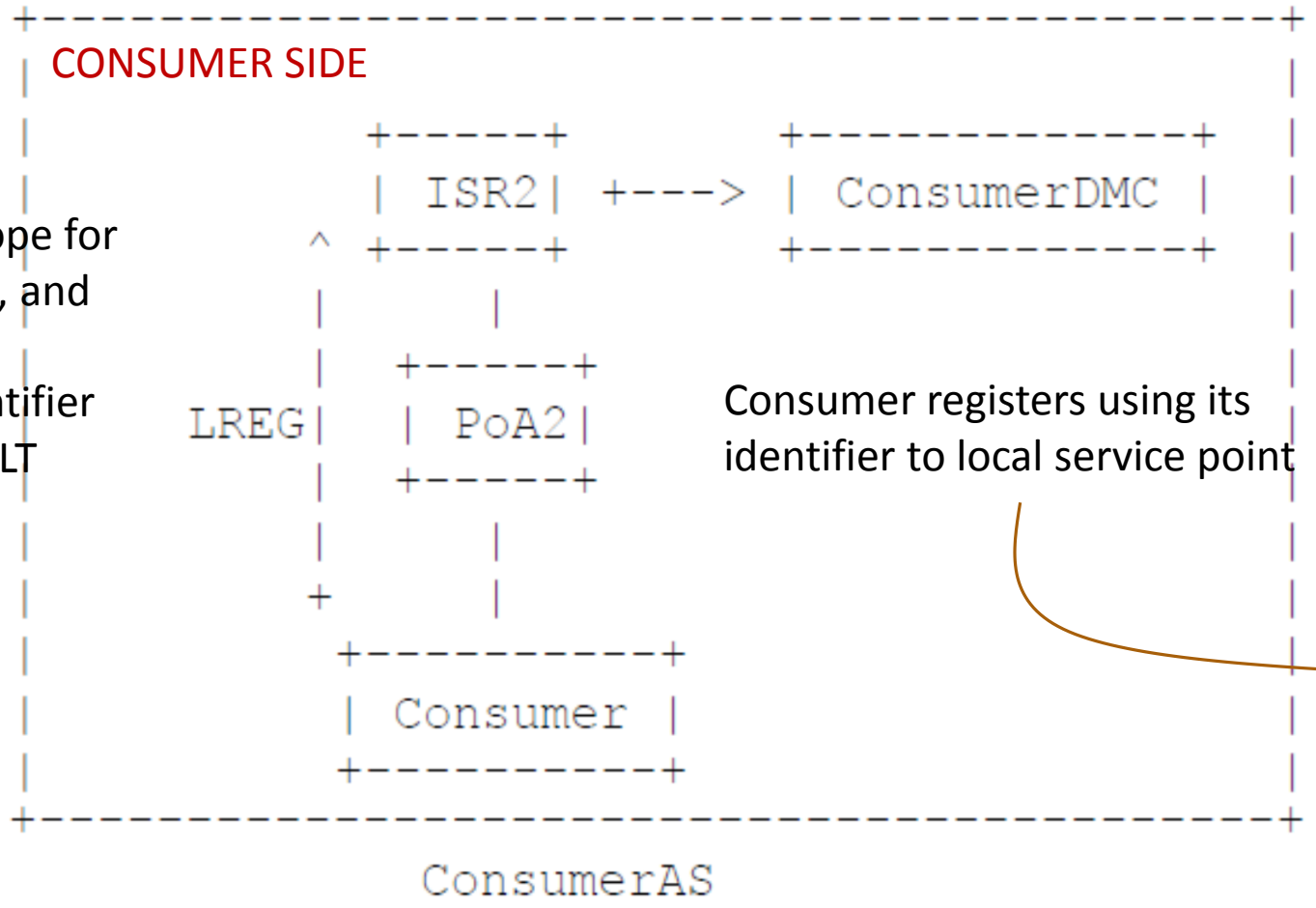

First-time registration within current domain Producer is visiting

Registration after handover to a different service point goes to local DMC

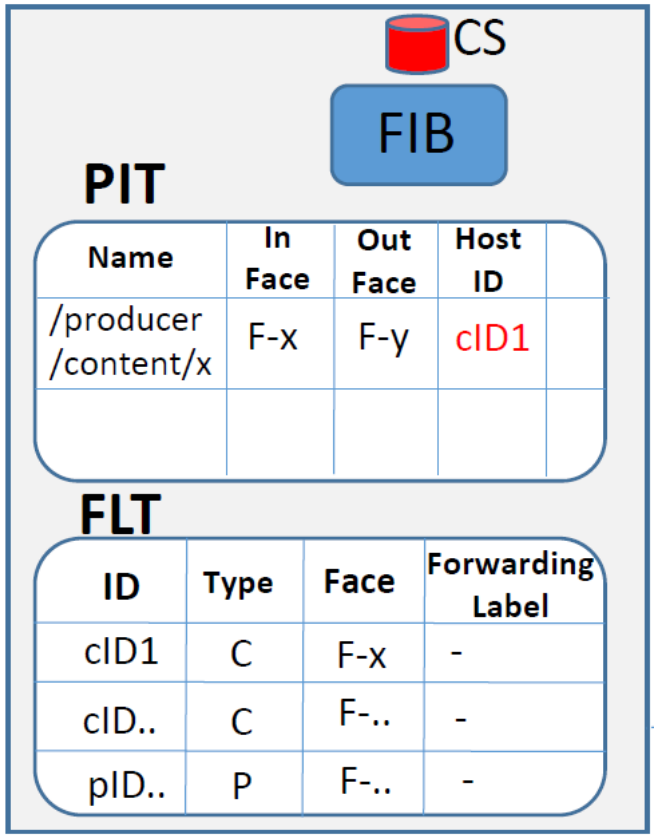
Inter-domain handover triggers timeout-based flushing of registration entries associated with Producer, and re-direct to new domain

# DMS Implementation – Registration

Forwarding scope for LREG is limited, and information on Consumer identifier is used to set FLT entries




Consumer registers using its identifier to local service point



# DMS Implementation – Content Delivery

Step 0: Assume registration phase is completed

Step 1: Consumer's service point identifies Producer locator

- If no match exists locally, uses Discovery through its DMC, and Producer's Home DMC if necessary

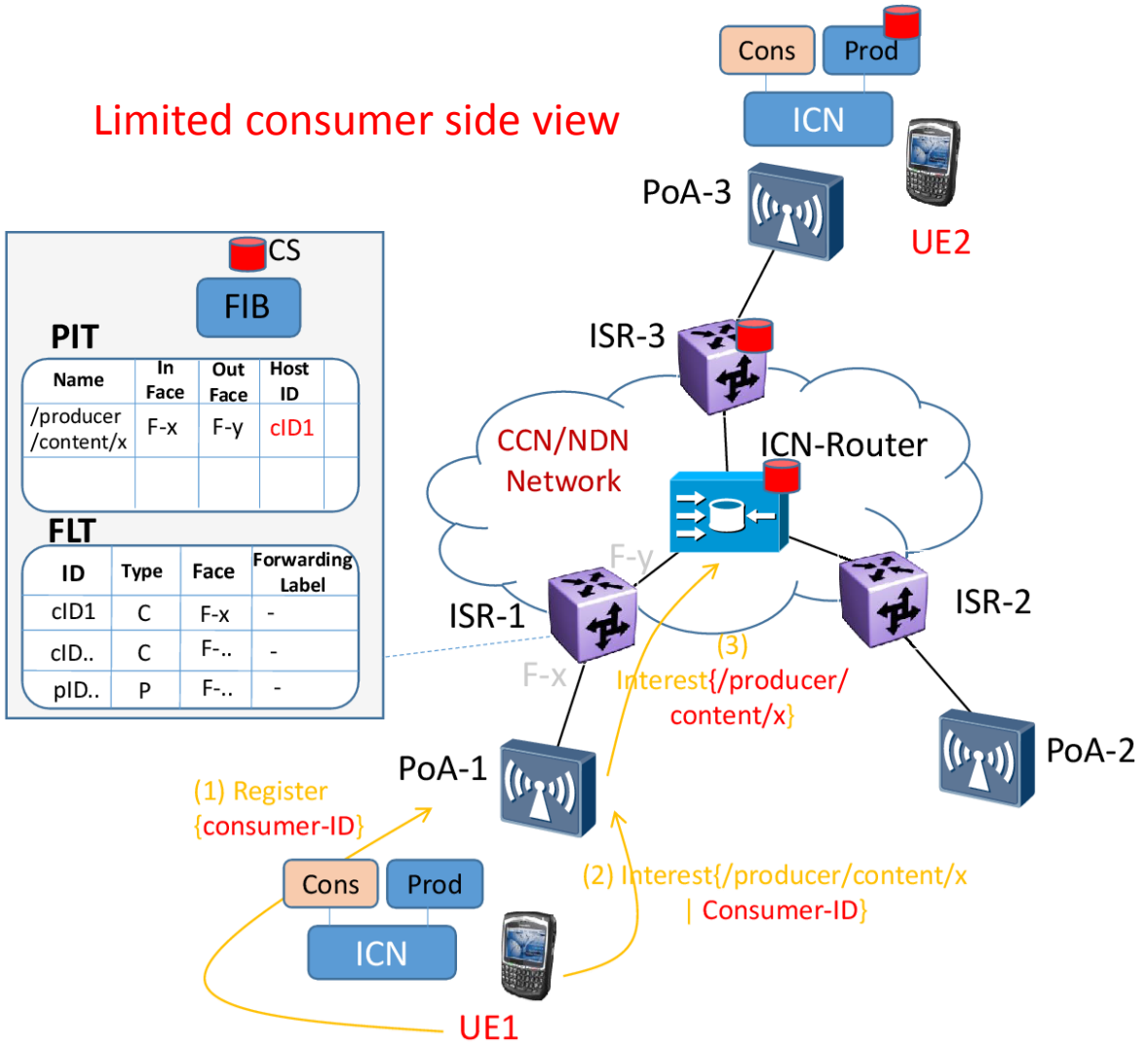
Step 2: Consumer requests include its identifier and are forwarded towards Producer's location, with PIT entries marked to include consumer identifier

Step 3: Request is forwarded by updating forwarding labels along the way to point to border routers, Producer domain, and service points

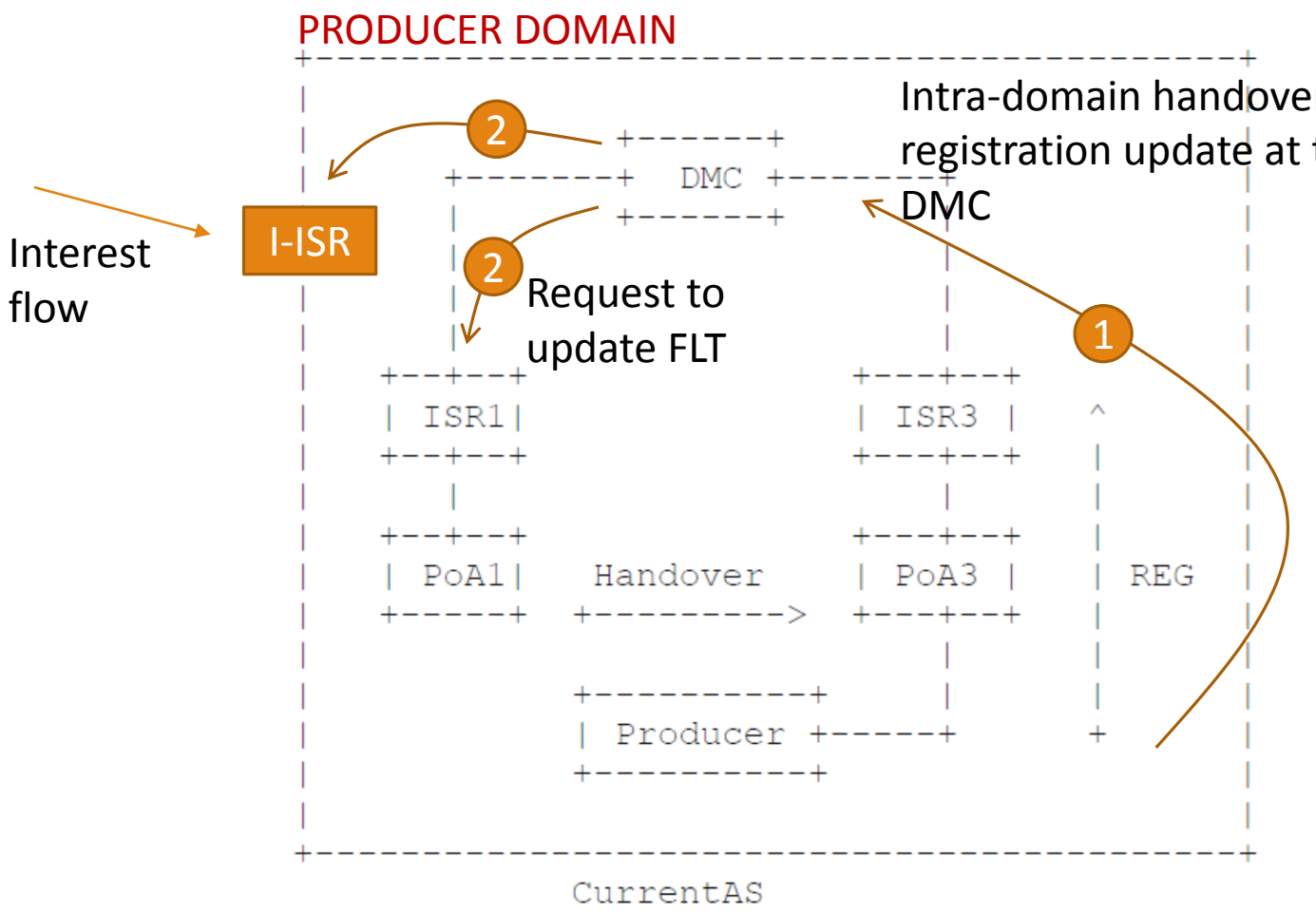
Step 4: Returning Data packets use PIT entries to trace back the forwarding path

Step 5: At the consumer side service point, if mobility service is enabled, Consumer identifier is looked up at the FLT to determine its attachment status

Step 6: With no handover, Data packets are forwarded directly to Consumer over matching interfaces



# DMS Implementation – Producer Handover




After update, FLT points to new service point for Producer

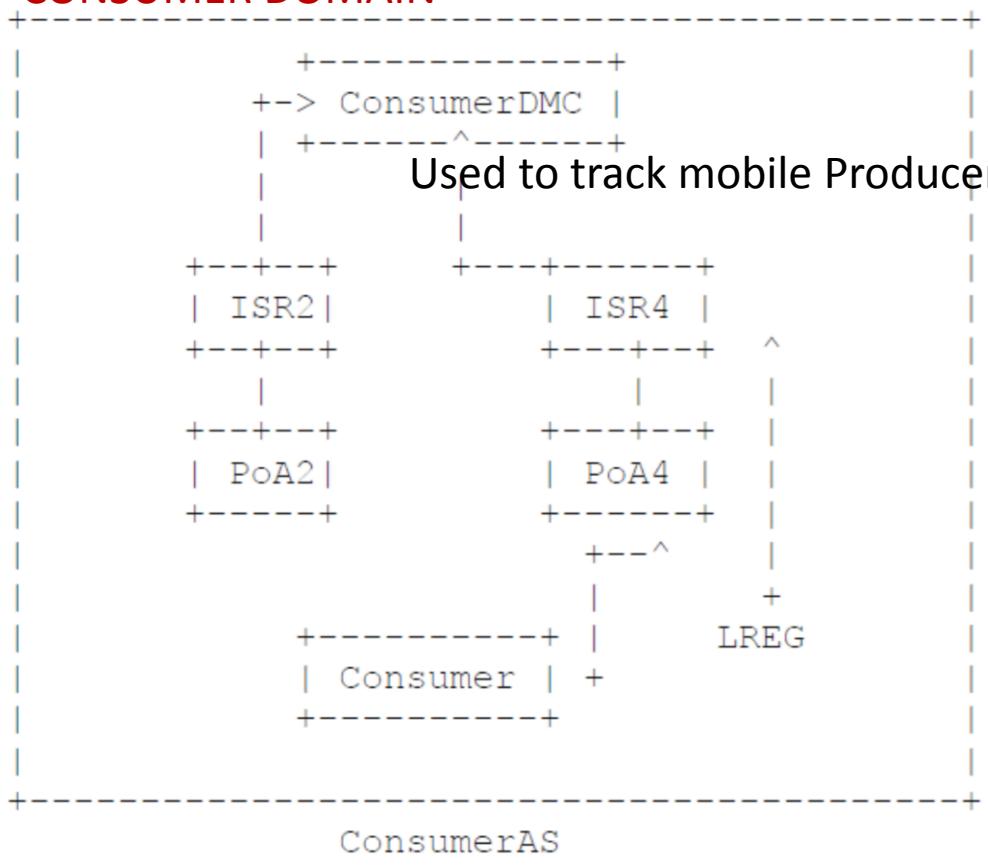
Inter-domain handover involves Producer's Home-DMC, and update message includes information on Producer's new domain

**Interest message received at previous service point after inter-domain handover are tagged** to alert consumer side for location update through tagging of Data packets by Producer,

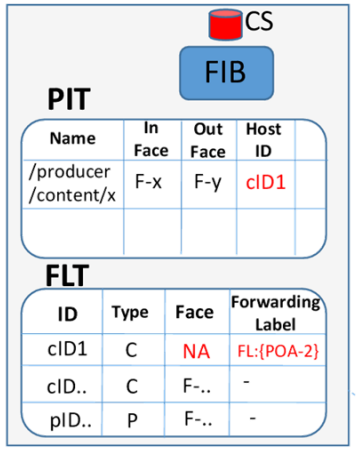
- Tagged Data packets can also be used by intermediate routers to update mappings

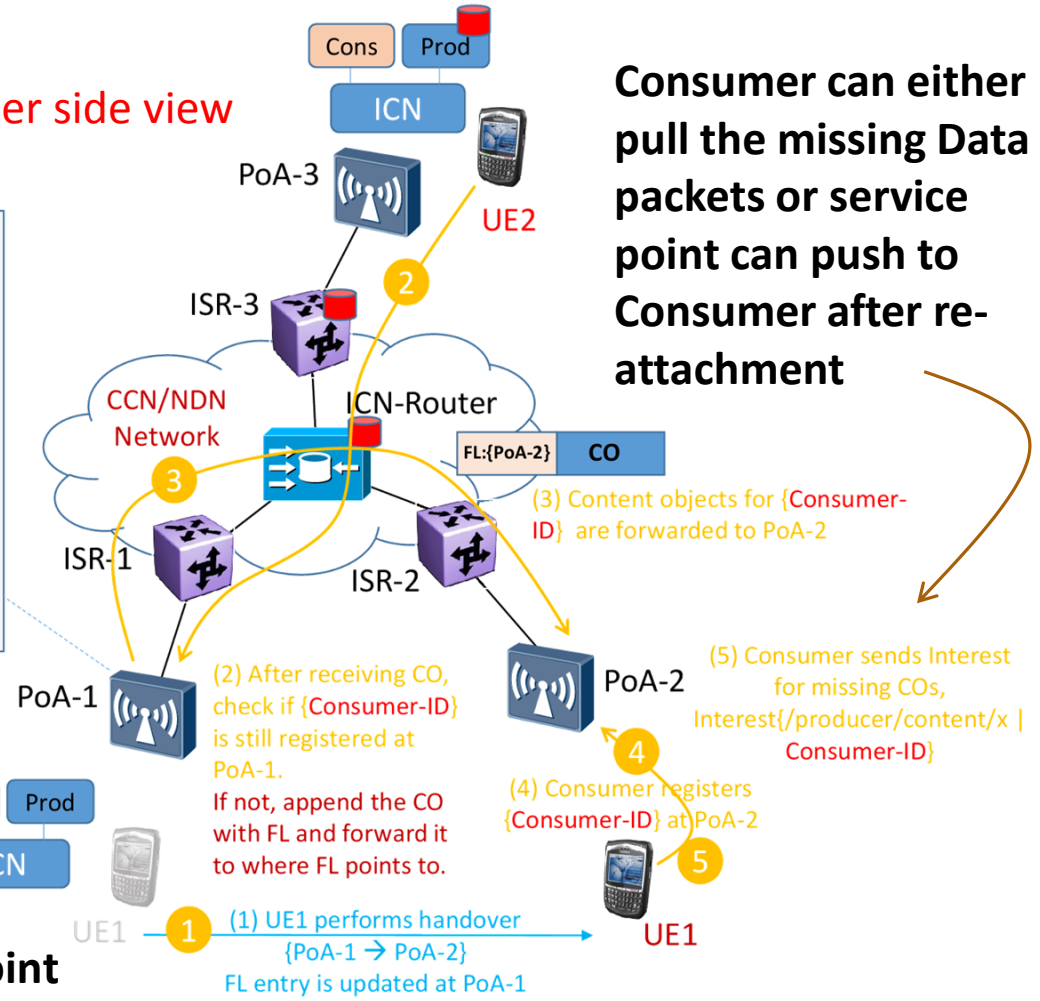
# DMS Implementation – Consumer Handover

CONSUMER DOMAIN




Limited consumer side view




**Consumer can either pull the missing Data packets or service point can push to Consumer after re-attachment**

**Old service point pushes Data packets to the Consumer's new service point**