

Reflexive Forwarding for CCNx and NDN Protocols

draft-irtf-icnrg-reflexive-forwarding-00

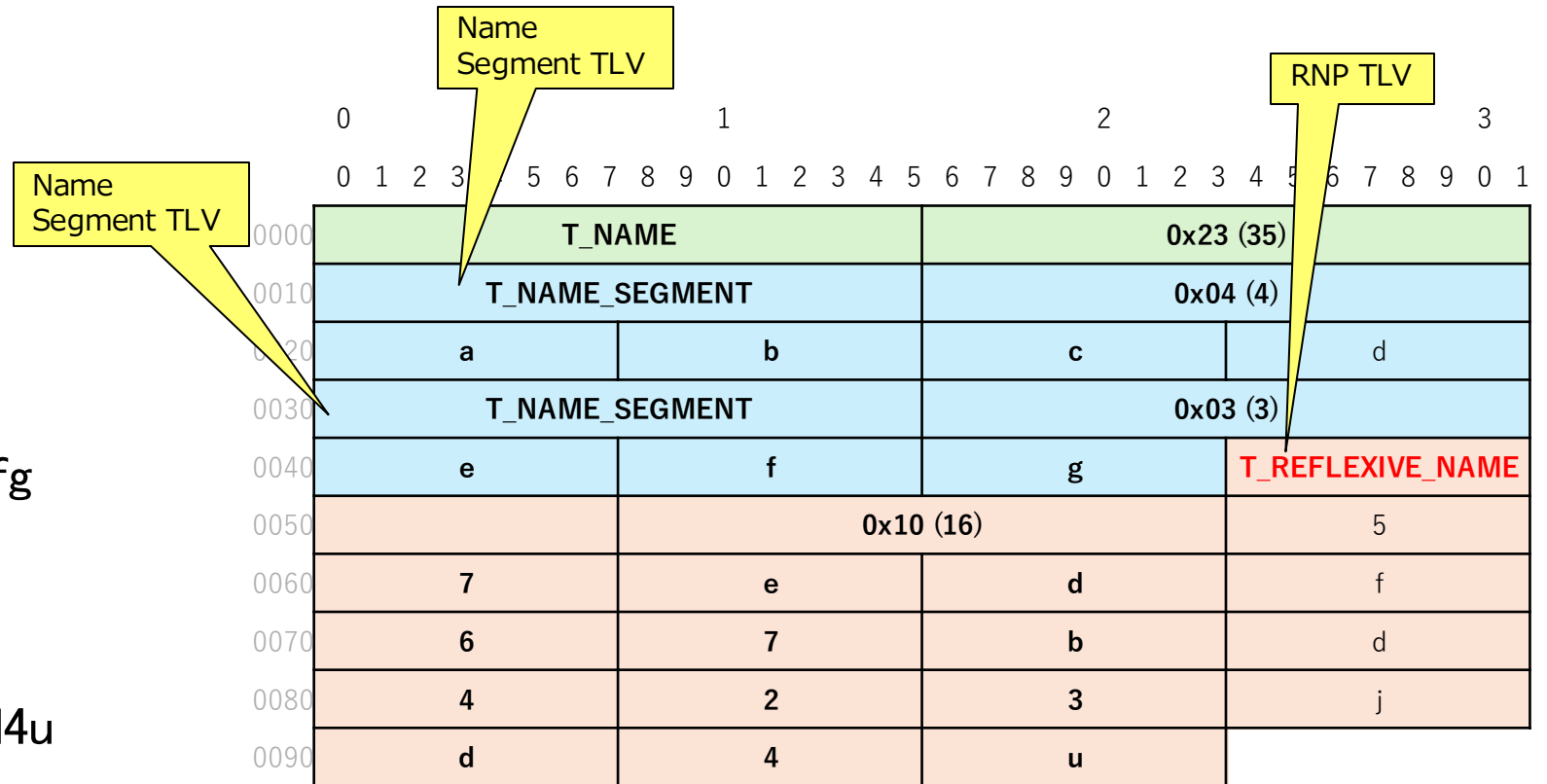
Dave Oran, Dirk Kutscher, and Hitoshi Asaeda

Terminology and Definitions

- Reflexive Interest (RI)
 - An interest message sent from a producer back towards a consumer to fetch data needed to satisfy the original interest.
- Trigger Interest (TI)
 - An interest message sent from a consumer to a producer to trigger one or more Reflexive Interests sent by the producer.
- Reflexive Name Segment
 - A high-order typed name segment which identifies an Interest as being a Reflexive Interest instead of a normal Interest.
- Reflexive Name Prefix (RNP) TLV
 - An Interest message indicating to a producer that it may fetch data from the sending consumer by issuing one or more corresponding Reflexive Interests. It consists of a Name prefix whose high-order is a Reflexive Name Segment.

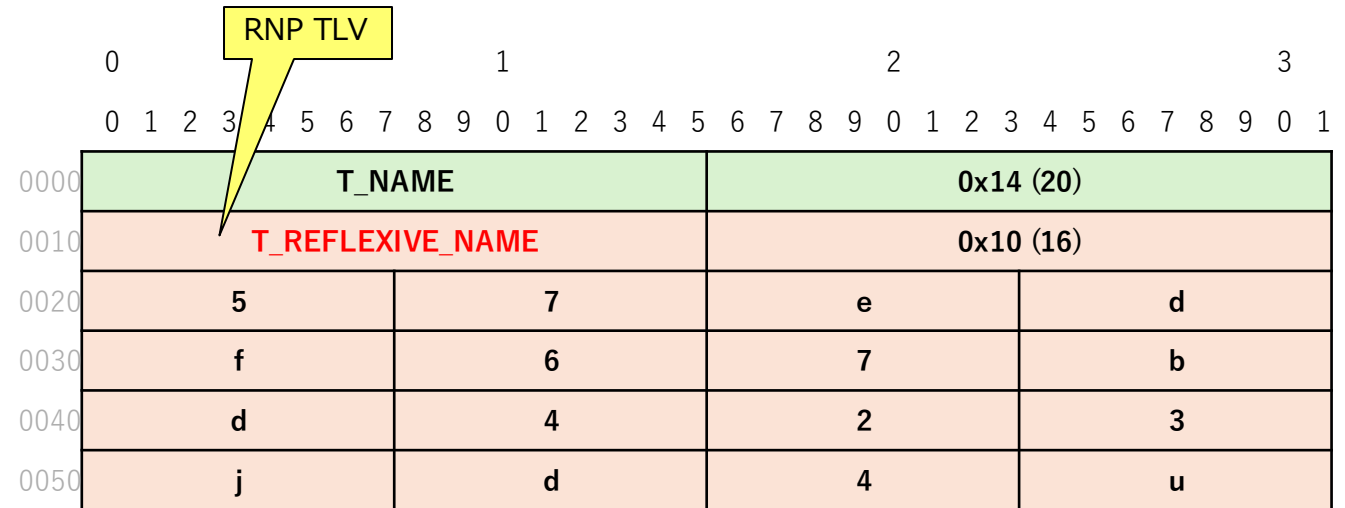
Trigger Interest/Data Message Format

- E.g., full name is;
/Name=abcd/Name=efg/
RNP=57edf67bd423jd4u
- Name Segment TLV
 - Type: T_NAME_SEGMENT
 - Name: /Name=abcd/Name=efg
- Reflexive Name Prefix TLV
 - Type: T_REFLEXIVE_NAME
 - Name: /RNP=57edf67bd423jd4u
 - The value of the Reflexive Interest Name Segment is assigned and uniquely identified by the consumer. For example, a UUID (a random 128 bit quantity [RFC9562]) can be used.



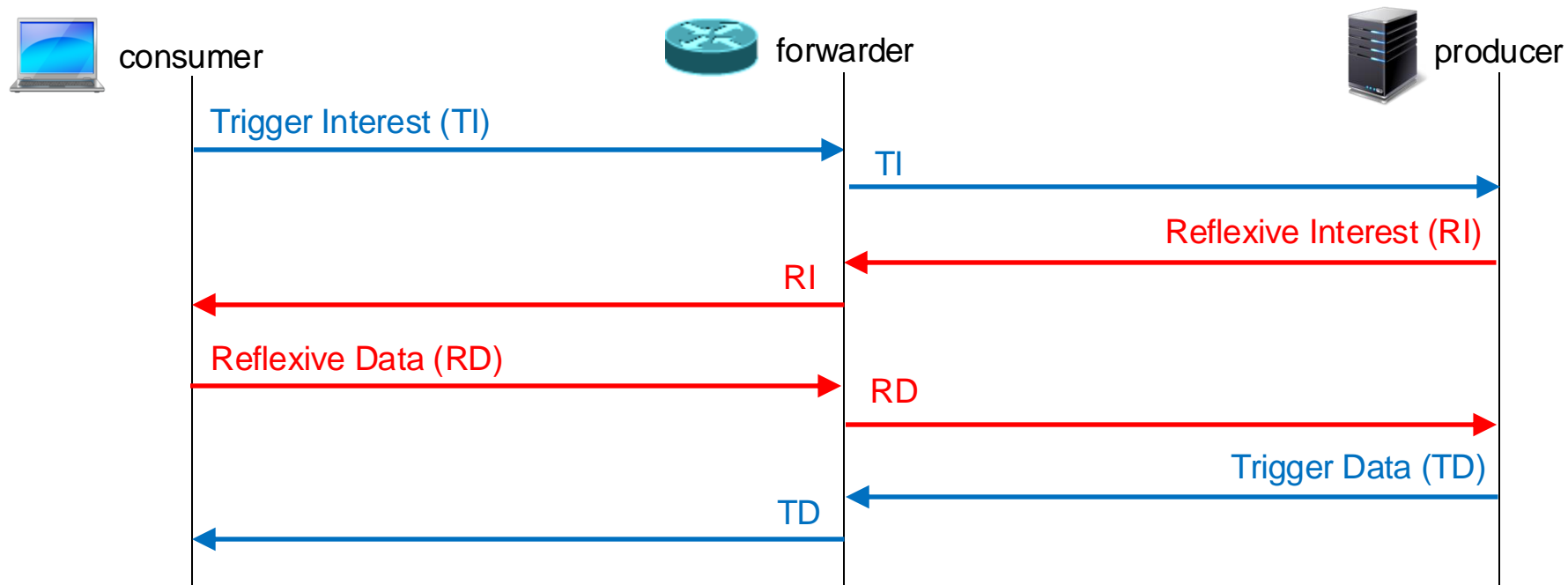
Reflexive Interest/Data Message Format

- E.g., full name is;
/RNP=57edf67bd423jd4u
- Reflexive Name Prefix TLV
 - Type: **T_REFLEXIVE_NAME**
 - Name: /57edf67bd423jd4u

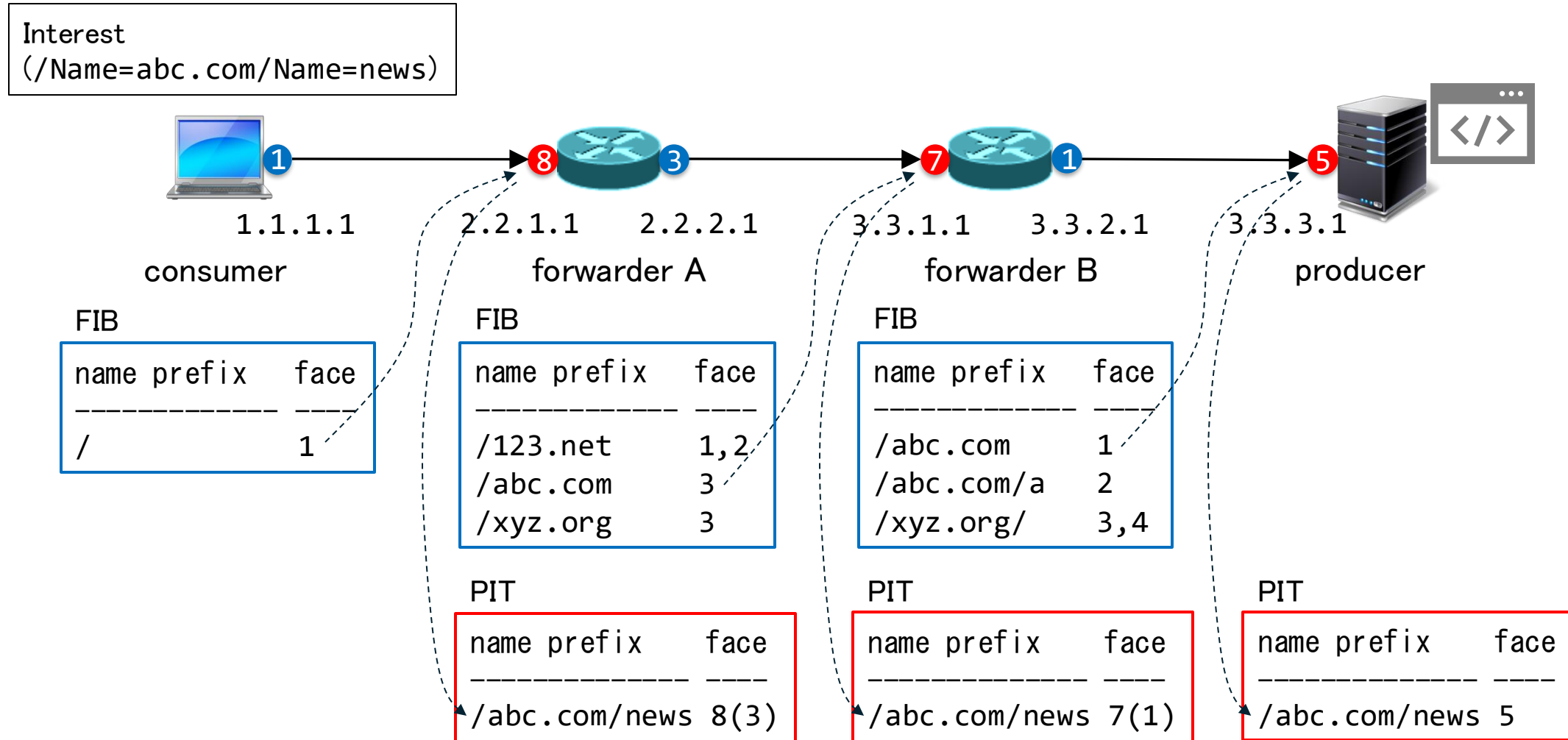


Trigger/Reflexive Interest/Data Forwarding Flows

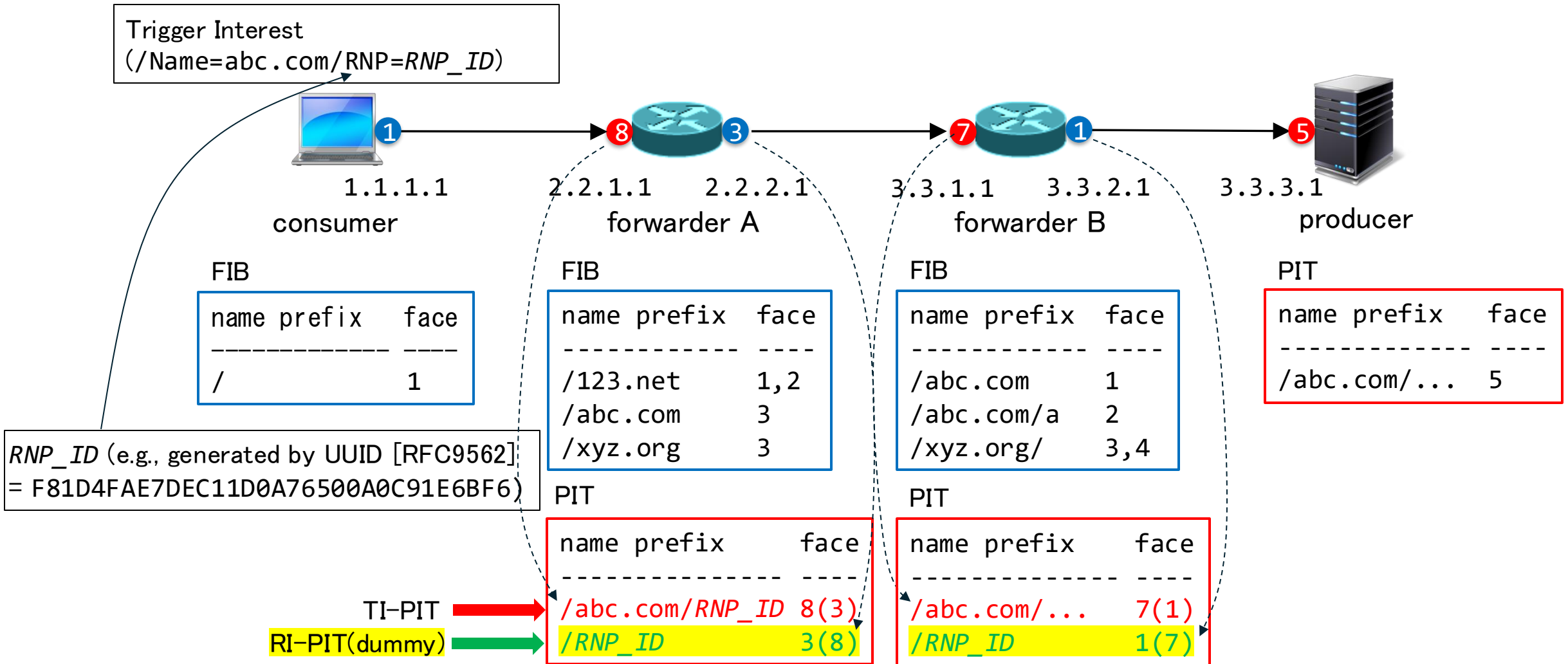
1. Consumer sends “Trigger Interest (TI)” to make publisher send “Reflexive Interest (RI)”.
2. Forwarder registers TI’s fullname (as TI-PIT) and Reflexive segment name (as RI-PIT(dummy)) and forwards TI.
3. Producer sends “Reflexive Interest (RI)” whose high order name segment is the Reflexive segment name specified in RNP TLV.
4. Forwarder registers Reflexive segment name (as RI-PIT) and forwards RI (without referring its FIB).
5. Consumer pushes its data using “Reflexive Data (RD)”, and producer receives the pushed data.
6. 3 to 5 may be repeated if RNP includes a chunk number.
7. Producer sends “Trigger Data (TD)” to terminate the process, and forwarder and consumer remove the corresponding PIT entries and close the session.



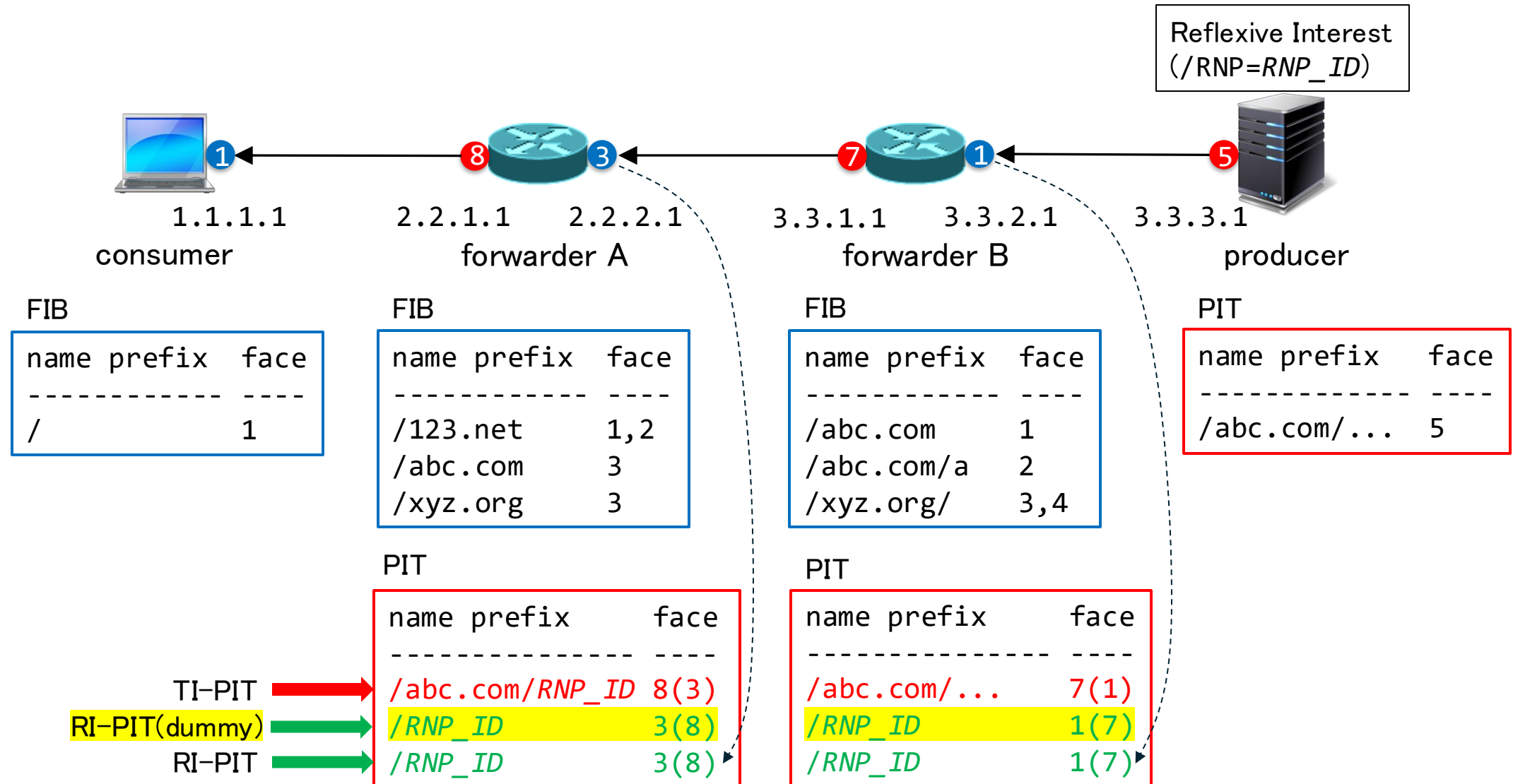
Ref: Conventional Interest Forwarding



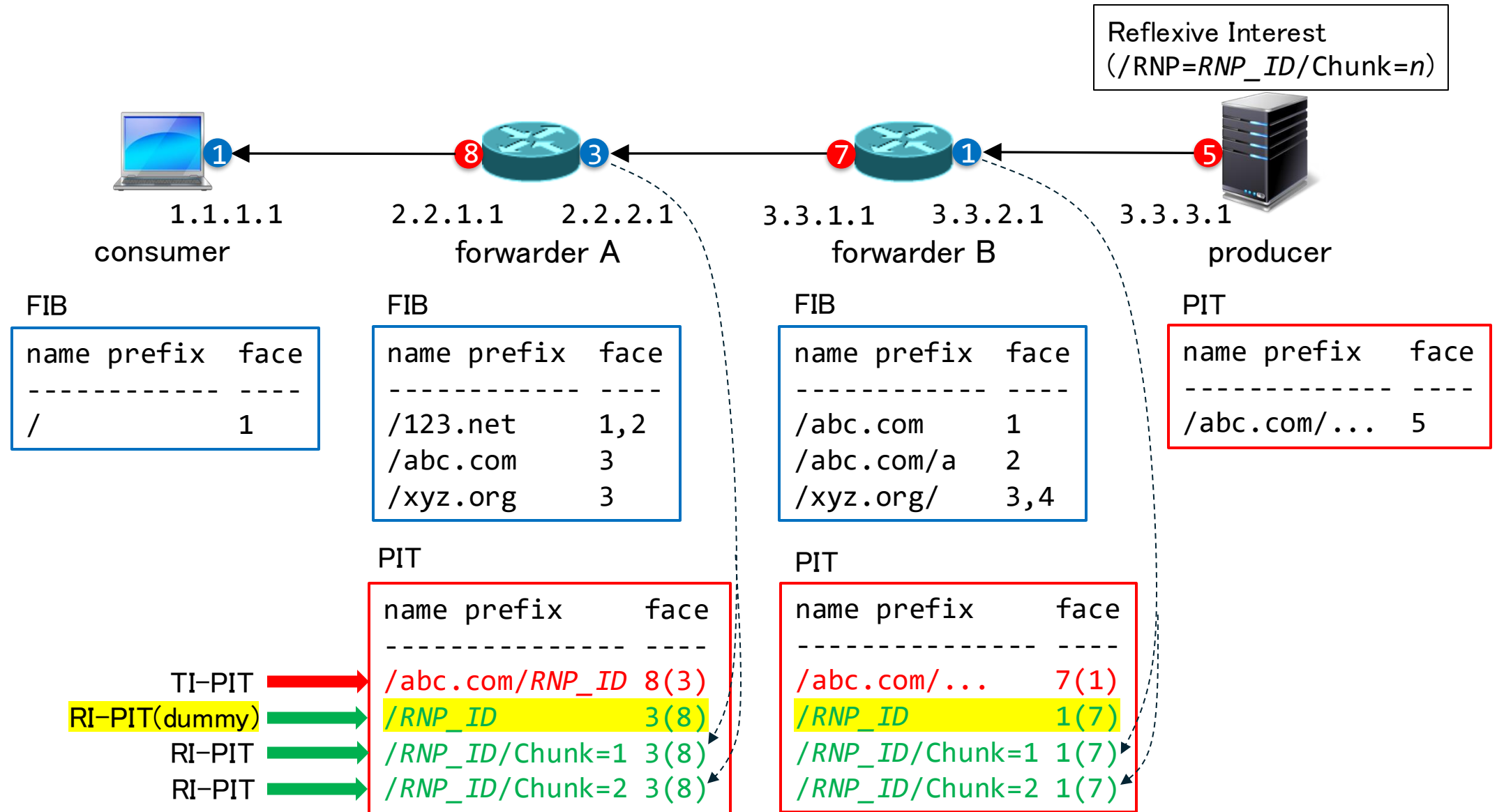
Reflexive Forwarding Operation – Trigger Interest



Reflexive Forwarding Operation – Reflexive Interest



Reflexive Forwarding Operation – Reflexive Interest (with chunking)



Next Steps

- Fix open issues and TODOs
 - Multiple RNP TLVs packing into a single TI can be allowed or not
 - If allowed, how to deal with them? Multiple RIs should be independently sent?
 - TD can be cached or not
 - If TD is cached, RI cannot be reached to publisher. Is it allowed as the expected behavior?
 - What if multiple publishers receive TI via multipath routes?
 - The first TD received removes TI-PIT and thus halts subsequent RD reception(s).
 - How RD can be securely transmitted

Next Steps – cont' d

- Please read and comment on the spec in general, not just on the specific issue the authors are working through.
- We have an in-progress implementation on Cefore (<https://github.com/cefore>), so please do some experiments for any use cases we've identified or new ones you can think of.

Particularly interested in:

- Phone home use case for IoT devices, especially low-end sensors
 - Web services
 - Distributed computing apps.
- etc.