# Non-routing information distribution

# Side meeting

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# Background: Non-Routing info in Routing protocols

- Complaint in IDR WG since ~2000
  - Perhaps earlier during 1st BGP-4 deployments
  - Re-emerged during BGP-LS
  - Came back again during BGP segment routing
- So, Listening again
  - Do we need to put non-routing information in different AFI/SAFI/Instance or something else

# Brief review of existing work

- BGP-based
- IGP-based
- BGP/IGP independent

# Transport Instance BGP *(draft-raszuk-ti-bgp, 2010, expired)*

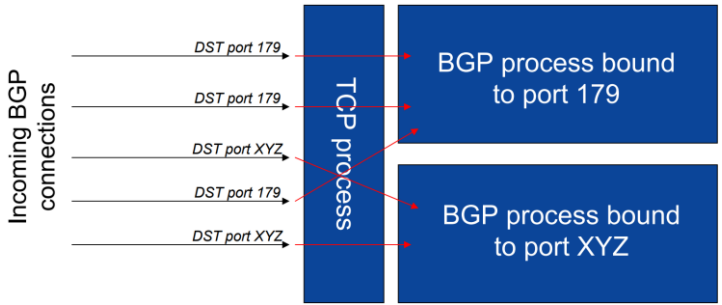
## Aim

- *BGP4 provides a good platform to carry various inter/intra-domain information, only a few of them are related to Internet routing; different applications may have different requirements (in term of scalability, response time, importance for SP / end customers...)*
- *This document proposes the creation of second BGP instance to allow for clear separation between BGP based applications on a per operator's choice*

## Characteristics

- *No impact to IGP; No change to BGP protocol other then port number for initial session establishment*
- *Ability to run the same application in both instances for easy migrations*
- *No new security concerns*

## TCP/BGP Daemon bounding



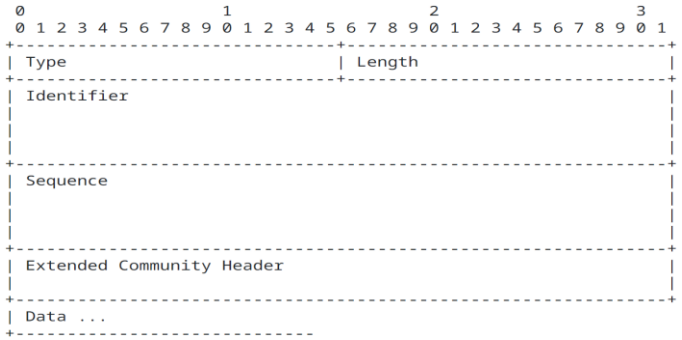

*Materials source: https://www.ietf.org/proceedings/75/slides/idr-0.pdf*

# BGP Based Generic TransPort *(draft-white-bgpbgp, 2014, expired)*

## Aim

- *This document proposes a new BGP message type with a well defined structure to use BGP peering sessions for information passed from provider to provider along edge peering points*
- *Allow any pair of BGP speakers to transfer information within an existing session, or for BGP peering semantics to be used with multihop sessions between "information exchange speakers" within an autonomous system*
- *Allow the encoding of virtually any information within a BGP session through the use of TLVs*

## Generic Transport Message (GTM)




**Identifier:** to uniquely identify the information carried

**Sequence:** to indicate the relative ordering of information of the same type and identity

## Generic Transport Capability

- *The BGP Based Generic Transport Capability is a new BGP capability.*
- *By advertising the BGP Based Generic Transport Capability to a peer, a BGP speaker conveys to the peer that the speaker is capable of receiving and properly handling GTMs.*

# RFC6823: Advertising Generic Information in IS-IS

## Aim

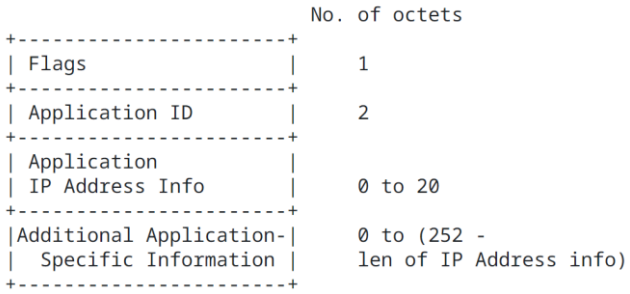
- *"This document describes the manner in which generic application information should be advertised in IS-IS LSPs and defines guidelines that should be used when flooding such information."*

## Characteristics

- *Use of a separate IS-IS instance*
  - ✓ *flooding & processing of the non-routing information to be decoupled from the information necessary to support correct routing of data in the network.*
  - ✓ *flooding & processing of non-routing information can then be prioritized appropriately.*

## GENINFO TLV definition

- *Type:251; Length: 3 to 255*
- *Value：*




**Application ID**

- An identifier assigned to this application via the IANA registry.

**Application-Specific Information**

- Out of scope of RFC6823.

# OSPF-GT (GENERALIZED TRANSPORT)

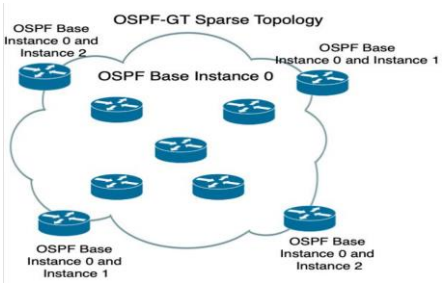
**Aim:**

- draft-ietf-lsr-ospf-transport-instance: *"This document presents mechanisms to advertise this non-routing information in separate OSPF Generalized Transport (OSPF-GT) instances."*

**Characteristics** *(https://datatracker.ietf.org/meeting/115/materials/slides-115-lsr-3-ospf-gt-01)*

- *OSPF-GT is NOT classic OSPF, and it doesn't compute routes.*
- *OSPF-GT is not dependent on any other OSPF instance. However, information should satisfy the "condition of reachability", which is verified via the OSPF-GT Topology although this could be relaxed for certain applications.*
- *OSPF-GT neighbors are not required to be directly attached, and its topology is independently defined.*

### OSPF-GT Sparse Topologies



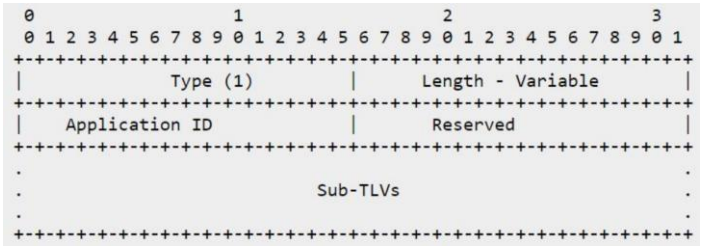

**Remote OSPF-GE Neighbor**

- A remote neighbor's address is configured, and IP routing is used to deliver OSPF-GT packets.

**Multiple Topologies**

- may support multiple topologies as defined in RFC4915

### OSPF-GT Information (GTI) TLV definition




**Possible use cases:**

- *5G MEC Service Discovery; Capabilities/functionalities dissemination; Potential BGP-LS alternative*

# Distributed Routing Object Information Database (DROID)

## Basic idea of DROID

Background

- *The backbone of a routing protocol is a small distributed database of routing information.*
- *Architecturally, it is a mistake that any service needing a distributed database has considered injecting its data into a routing protocol, which puts the protocol at risk from undue complexity and overhead.*

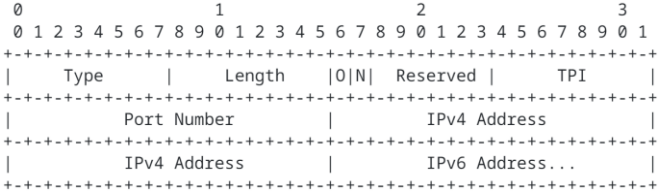
DROID

- *A subsystem that is independent of the routing protocols, provides distributed database services*
  (Note: Bootstrapping of DROID still needs OSPF/IS-IS advertisement)
- *Based on the Pub/Sub architecture and is intentionally crafted to be an open mechanism for the transport of ancillary data*
- *Use Caes:*
  - ✓ *Node liveness; Node capabilities etc.*

## DROID Messages

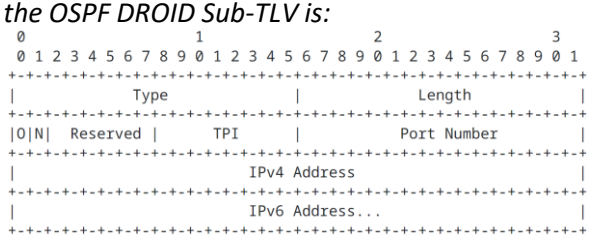
### DROID Advertisement in IS-IS

*IS-IS DROID sub-TLV as part of the IS-IS Router Capability TLV [RFC7981]*




### DROID Advertisement in OSPF

*DROID service is provided by the OSPF Node Liveness Sub-TLV, The format of the OSPF DROID Sub-TLV is:*



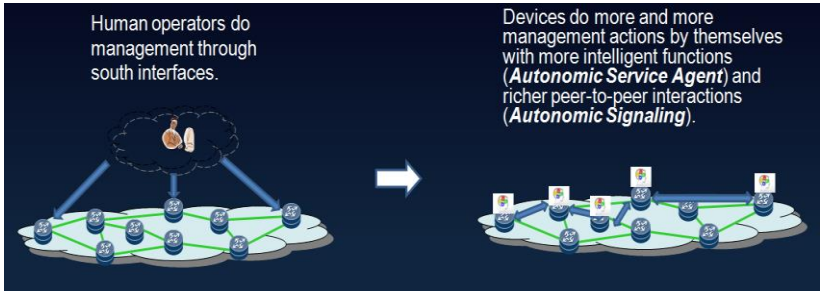

### DROID Messages

- ✓ Publish: to change a data value in the database
- ✓ Subscribe: to create a subscription for a set of data items
- ✓ Notification: generated when a database item is modified

# RFC8990: GeneRic Autonomic Signaling Protocol (GRASP)

(and draft-ietf-anima-grasp-distribution)

## Basic idea of ANIMA approach




- ANIMA is to enable network devices to autonomically accomplish tasks such as discovery, network access control, forming a solid management plane, and doing some configurations etc., with minimal requirements of a central controller.
- GRASP is a signaling protocol developed by ANIMA WG to provide following generic functions that aim to cover most of the interactions models between devices

## GRASP Messages

- Discovery Message
- Discovery Response Message

**Discovery interaction**
- link-local broadcast
- assigned a dedicated IPv6 multicast address and monitoring port (7017)

- Request Messages
  - *(Negotiation Flag)*
- Negotiation Message
- Negotiation End Message
- Confirm Waiting Message

**Negotiation interaction**
- Allowing multiple rounds interaction between two nodes to converge on a result

- Request Messages
  - *(Synchronization Flag)*
- Synchronization Message

**Sync interaction**
- Single round information exchange

- Flood Synchronization Message

**Flooding interaction**
- Loop-free information flooding

**Sub-Pub interaction**
- Augmented by *draft-ietf-anima-grasp-distribution*

# Discussion

- Requirements
  - General (by design principles)
  - Specific (by possible use cases)
- Which way to go?
  - BGP-based approach
  - IGP-based approach
  - Routing protocol independent approach
- Next step
  - A mailing list?
  - Another side meeting?
    - Dig into more specific use cases and requirements

# Discussion

- Requirements
  - General (by design principles)
    - ✓ Separation between routing and non-routing data distribution/processing
      - Protocol message level,
      - protocol instance level,
      - or different protocol level separation?
    - ✓ Non-routing data distribution might also require a distributed database services, which might need:
      - Flooding capability?
      - Pub-Sub capability?

# Possible use cases

## (rough) Example-1: 5G MEC

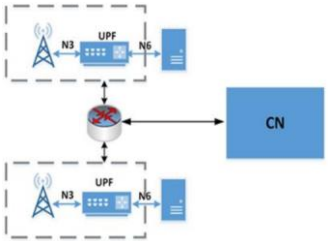
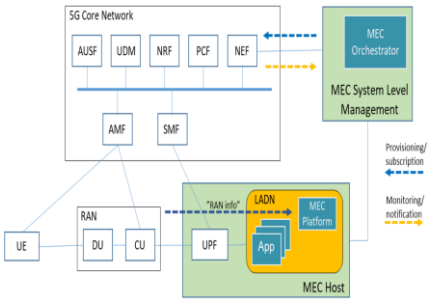



Fig. MEC-UPF collocated with BS

*(Quoted from OSPF-GT)*

- **Auto-discovery** of the service locations
- **Service state** transferring and synchronization for application mobility
- **Network resources** information population

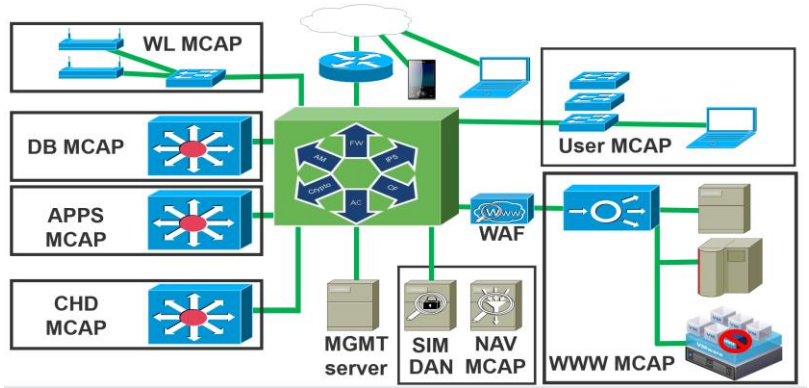



**Capabilities exposure**

*(Quoted from ETSI MEC WP)*

- **Monitoring**: request or subscribe to UE related events of interest
- **Provisioning**: provision expected UE behavior (movement, communication characteristics etc.) to the 5G system
- **Policy and Charging**: Handles QoS and charging policy for UE based requests made by an external party

## (rough) Example-2: Zero Trust network access




- **Endpoint state synchronization:** IPv6 address, security assessment of endpoints might change, the AP/Gateways need to syn these information in a real time

*https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp28_mec_in_5G_FINAL.pdf*

*https://www.forrester.com/staticassets/forresterDotCom/Webinars/2016/09/ppt/Webinar_092616_Facemire_et%20al__.ppt*

# Next step

- Creating a mailing list for continuous discussion
- Planning another side meeting?
  - Dig into more specific use cases
  - Try to converge the requirements
  - Try to converge the way to go

Thank you!