Endpoint Properties Extensions

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Motivations

- The initial purpose for ALTO protocol is to provide better than random peer selection for p2p networks.
- Since then
  - ALTO can be used in serving a variety of applications
  - ALTO should be able to provide richer information
- Candidate for the chartered work item
  - Protocol extensions to convey a richer set of attributes to allow applications to determine not only "where" to connect but also "when" to connect.
  - Such additional information will be related both to endpoints and to endpoint-to-endpoint cost.
  - May 2015 Submit endpoint property extension document.

Property Categories

- Geolocation properties
  - Geographic location of the end point
- Node related properties
  - Software/hardware configuration
  - Participating role of the end point (e.g. as a end user, or a CDN server, or a P2P cache, etc.)
- Attached network properties
  - The type and configuration of the access network (e.g. 2G/3G/4G, WLAN, DSL, etc.)
  - Network topoloy (e.g. ASN, Rack-id, etc.)
- Subscription related properties
  - Information about subscription agreement with the ISP

Guidelines and Methodology

- "Keep the extended set to a minimum"
- 3-step iterative process
  - (Usefulness) only add those with clear motivation and applicable scenarios.
  - (Non-redundancy) avoid adding a property whose value can be implied by an already defined property or any combination of them.
  - (Generality) group case-specific properties with single generalized property (with different value for different applications/scenarios).

Privacy Considerations

- Observations from the list discussions
  - General concern for almost all EP properties
  - **(prop, subscriber, app, ISP) => privacy level**
- 2-step design process
  - Pre-discussion over generally applicable schemes
  - Apply them to each property definition later
- General mitigation schemes
  - Privacy-preserving information mapping:
    same information, different data types
    - Conditional type: property X<attribute>: subtype1, subtype2,...
    - Different types: property X => X-ranking, ...
  - Access control enforced by the ALTO server (deployment specific)

Relevance to other drafts

- Included virtual EP properties into discussion
  - [I-D. draft-wu-alto-endpoint-pid-properties]
- Not intend to provide real-time properties
  - [I-D.draft-wu-alto-te-metrics]
- Provides the property namespace for PID properties
  - [I-D.draft-roome-alto-pid-properties]

Extended EP Properties

Overview

- I-D.draft-deng-alto-p2p-ext

Identifier	Intended Semantics	
geo-location	TBA.	Geolocation properties
participating_role (string)	The type of end point's role, value is enumerated as "user", "p2pcache" "super-node", etc. in ASCII.	Node related properties
battery_limited (boolean)	Whether the peer is battery-limited, value is "true" or "false".	
network_access (string)	The type of access network of the peer, value is enumerated as "adsl", "ftth", "fttb", "dc", in ASCII.	Network related properties
link_preference (number)	The relative preference from the ISP's point of view based on the type of network access of the peer, value is a integer.	
volume_limited (boolean)	Whether the peer's plan is constrained, value is "true" or "false".	Subscription related properties
provisioned_bandwidth	TBA.	

Geolocation

Geolocation<Precision>

- Proposed by early discussion and suggested in the new charter
- Intitial Considerations
  - JSON conditional type
    - precision==countrycode: type=string
    - precision==boudingbox: type={latul, longul, latbr, longbr}
    - precision==circle: type={latc, longc, radius}

Node-related
participation_role

- Proposed by early discussion
- Useful when peer selection also impacted by the participating stategry of the end hosts
  - different participating parties (subscriber, ISP, or ICP) within an application's service transaction demonstrate different role/policies
- Initial considerations
  - JSONString participation_role
  - possible values: 'user', 'cache', 'super node'.
  - IANA registry.

Node-related
battery_limited

- Assumption:
  - Electric power supplied nodes would stay online longer than those battery supplied nodes.
  - Battery powered devices are usually less willing to act as super peer, relay, etc.
- Useful when a considerable long existence online is essential or preferrable in peer selection
- Initial considerations
  - JSONboolean battery_limited
  - Possible values: 'true', 'false'.

Network-related
network_access

- Assumption: an end host's link metrics is dependent to the type of access technology
- Useful when the access bandwidth, stability or other features concerns the application
- Initial considerations
  - JSONString access_type;
  - Possible values: 'adsl', 'ftth', 'fttb', 'dc', '2G', '3G', '4G'.
  - IANA registry.

Subscription-related
volume_limited

- Assumption: mobile subscribers with an upper limit to their data plan should not be avoided in peer selection
  - Higher charge for excessive data, or
  - Throttled bandwidth
- Initial considerations
  - JSONBoolean volume_limited
  - Possible values: 'true', 'false'

Subscription-related

Provisioned_bandwidth<precision>

- Suggested by earlier discussion and included in the new charter
- For uploading services, peer's uploading bandwidth is essential for the selection
- Initial considerations
  - JSON conditional type
    - precision==raw: type={value, meter}
    - precision==ranking: type=integer

Virtual Endhost Properties

- Incoporating with virtual EP properties in I-D. draft-wu-alto-endpoint-pid-properties
  - node/servicetype merged with participating_role
    - 'firewall', 'DPI', 'load-balancer', etc
  - forwarding class, as a network related property
  - *utilization, real-time dynamic value, not included
  - *capacity, added as a node related property
    - ? overlap with provisioned_bandwidth

Virtual EP Properties

Forwarding_class

- The type of forwarding class the endpoint or network supports
  - newtork-related property
- Initial considerations
  - JSONString forward_class
  - Possible values: 'expedited forwarding', 'assured forwarding', 'network control', 'best effort '.

Virtual EP Properties

Local_capacity

- *capacity, added as a node related property
- NO overlap with provisioned_bandwidth
  - capacity being a node-related property
  - provisioned beging a network-related property
- initial considerations
  - JSONobject local_capacity
    - "local_capacity": {
      - "CPU": {"volume": integer, "meter": string},
      - "memory":{"volume": integer, "meter": string},
      - "storage": {"volume": integer, "meter": string}
    - }

Next Step

- Possible next steps
  - welcome more feedback from the list
  - WG adoption

backup

network_related
link_preference

- network_access may bring privacy concerns
  - exposure of a subscriber's economic status
- aggregated relative ranking instead of direct exposure of individual information
- Initial considerations
  - integer
  - 1 = DSL; 10 = FTTB; 12 = FTTH; 50 = DC;
  - convenient for the ISP to adapt its ranking policy
    - e.g. add "X=new_technology", when some new technology appears later