

A YANG Module for Entitlement Inventory

draft-ietf-ivy-entitlement-inventory

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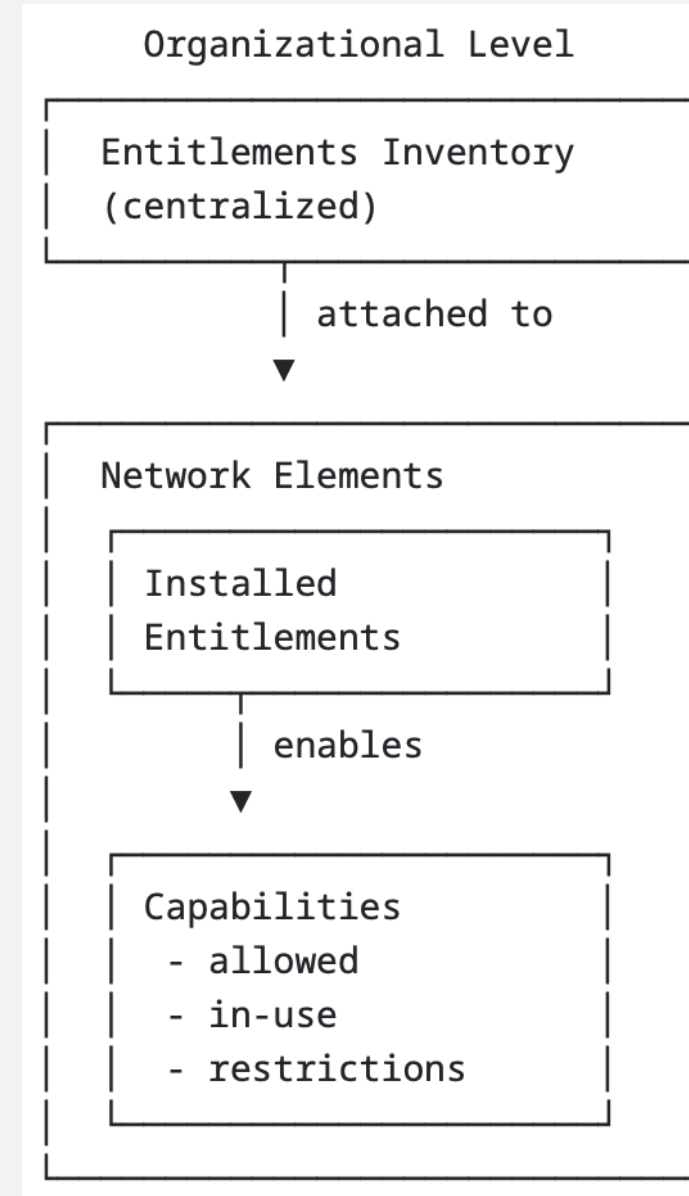
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Earning Adoption

- Thorough update of the document
- Beyond the original discussion on concepts and trees
 - Once we consolidated them
 - They have also been reviewed
- A complete module definition
 - Including a whole tree update
 - And a discussion of the design decisions
- A thorough set of canonical examples for
 - Understanding core concepts
 - Exploring application scenarios
 - Identifying implementation patterns
 - Validating (future) implementations

Updated Concepts

- A more focused definition of the basic concepts: *capability*, *entitlement*, *installed entitlement*, *restriction*, *asset*
- A focused capability model
 - Including an extension pattern
 - Leaving a more formal definition to parallel work
- A more precise anchoring of entitlements to the base model
 - Clarifying the installation and attachment mechanisms



Support for Incremental Model Adoption

Five proposed levels

1. Centralized entitlement inventory
 - ✓ What entitlements does the organization have?
2. Installed entitlements on network assets
 - ✓ What entitlements are actively entitling which assets?
3. Capability reporting
 - ✓ What can each asset do?
4. Capability-entitlement linkage
 - ✓ Which entitlements enable which capabilities?
What is allowed and what is in use?
5. Restriction reporting
 - ✓ What constraints apply to entitlements and capabilities?
What are the current usage levels

Model definition

```
module: ietf-entitlement-inventory

augment /inv:network-inventory/inv:network-elements/inv:network-element:
  +--ro installed-entitlements!
  +--ro entitlement* [entitlement-id]
  +--ro entitlement-id -> /inv:network-inventory/ei:entitlements/entitlement/e
  +--ro in-use? boolean
augment /inv:network-inventory/inv:network-elements/inv:network-element/inv:components/
  +--ro installed-entitlements!
  +--ro entitlement* [entitlement-id]
  +--ro entitlement-id -> /inv:network-inventory/ei:entitlements/entitlement/e
  +--ro in-use? boolean
augment /inv:network-inventory/inv:network-elements/inv:network-element:
  +--ro capabilities!
  +--ro capability-class* [capability-class]
  +--ro capability-class identityref
  +--ro capability* [capability-id]
  +--ro capability-id string
  +--ro extended-capability-description? string
  +--ro entitlement-state!
  | +--ro allowed? boolean
  | +--ro in-use? boolean
  +--ro supporting-entitlements!
  | +--ro supporting-entitlement* [entitlement-id]
  | +--ro entitlement-id -> ../../../../../../installed-entitlements/en
  +--ro capability-restrictions!
  +--ro capability-restriction* [restriction-id]
  +--ro restriction-id string
  +--ro description? string
  +--ro resource-name? string
  +--ro units? string
  +--ro max-value? int32
  +--ro current-value? int32
augment /inv:network-inventory/inv:network-elements/inv:network-element/inv:components/
  +--ro capabilities!
  +--ro capability-class* [capability-class]
  +--ro capability-class identityref
  +--ro capability* [capability-id]
  +--ro capability-id string
  +--ro extended-capability-description? string
  +--ro entitlement-state!
  | +--ro allowed? boolean
  | +--ro in-use? boolean
  +--ro supporting-entitlements!
  | +--ro supporting-entitlement* [entitlement-id]
  | +--ro entitlement-id -> ../../../../../../installed-entitlements/en
  +--ro capability-restrictions!
  +--ro capability-restriction* [restriction-id]
  +--ro restriction-id string
  +--ro description? string
  +--ro resource-name? string
  +--ro units? string
  +--ro max-value? int32
  +--ro current-value? int32
```

```
augment /inv:network-inventory:
  +--ro entitlements!
  +--ro entitlement* [entitlement-id]
  +--ro entitlement-id string
  +--ro product-id? string
  +--ro sku? string
  +--ro vendor? string
  +--ro part-number? string
  +--ro state? entitlement-state-t
  +--ro renewal-profile
  | +--ro activation-date? yang:date-and-time
  | +--ro start-date? yang:date-and-time
  | +--ro expiration-date? yang:date-and-time
  +--ro restrictions!
  | +--ro restriction* [restriction-id]
  | +--ro restriction-id string
  | +--ro description? string
  | +--ro resource-name? string
  | +--ro units? string
  | +--ro max-value? int32
  | +--ro current-value? int32
  +--ro parent-entitlement-uid? -> ../../entitlement/entitlement-id
  +--ro entitlement-attachment
  +--ro universal-access? boolean
  +--ro holders
  | +--ro organizations_names
  | | +--ro organizations* string
  | +--ro users_names
  | +--ro users* string
  +--ro assets
  +--ro elements
  | +--ro network-elements* -> /inv:network-inventory/network-elements/n
  +--ro components
  +--ro component* [network-element component-id]
  +--ro network-element -> /inv:network-inventory/network-elements
  +--ro component-id -> /inv:network-inventory/network-elements
```

Up to Eight Examples

| Title | Complexity | Key Concepts | Operational Question Addressed |
|------------------------------|------------|---|--|
| Basic Structure | Simple | Fundamental relationships, entitlement states | What are the core components of the model? |
| Expired License Handling | Simple | Lifecycle management, state transitions | How does the model handle expired entitlements? |
| Utilization Tracking | Moderate | Restrictions, usage monitoring | What constraints apply and how to track usage? |
| Hierarchical Entitlements | Moderate | Parent-child relationships, tiered licensing | How to model license upgrades and dependencies? |
| License Pooling | Advanced | Shared entitlements, multi-device allocation | How to manage pooled licenses across devices? |
| Multi-Vendor Environment | Advanced | Heterogeneous networks, vendor diversity | How to unify entitlements across vendors? |
| Component-Level Entitlements | Advanced | Modular devices, granular licensing | How to track entitlements for device components? |
| Capability Class Extension | Expert | Extensibility, external references | How to integrate custom capability models? |

Covering different levels of complexity and addressing different operational issues

Planning Next Steps

- The document is essentially completed
 - Concepts, model and examples
- We believe is time to start formal reviews
 - For sure, any comment from the WG
 - YANG Doctors
 - Shepherd
- Aiming at last call once these phases are completed