

The background is a vibrant, abstract graphic. It features a central bright white light source from which numerous colorful rays emanate, creating a sunburst or starburst effect. The rays transition through a spectrum of colors including yellow, orange, red, purple, and various shades of blue. Overlaid on this are large, flowing, wavy bands of color in shades of blue, green, yellow, and orange, giving the impression of liquid or smoke. The overall composition is dynamic and energetic.

CISCO *Live!*

Let's go



The bridge to possible

Headaches from YANG Models?

Using YANG Suite to Automate and Validate
your Journey to Programmability

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Agenda

- Introduction
- Model-Driven Programmability
- Cisco YANG Suite
 - Overview
 - Using YANG Suite
- Conclusion

Who am I?



Personal

- Based in London

Career

- 40+ years in some aspect of Information Technology
- 19 + years focus in FSI
- 15+ years at Cisco Systems, Inc.

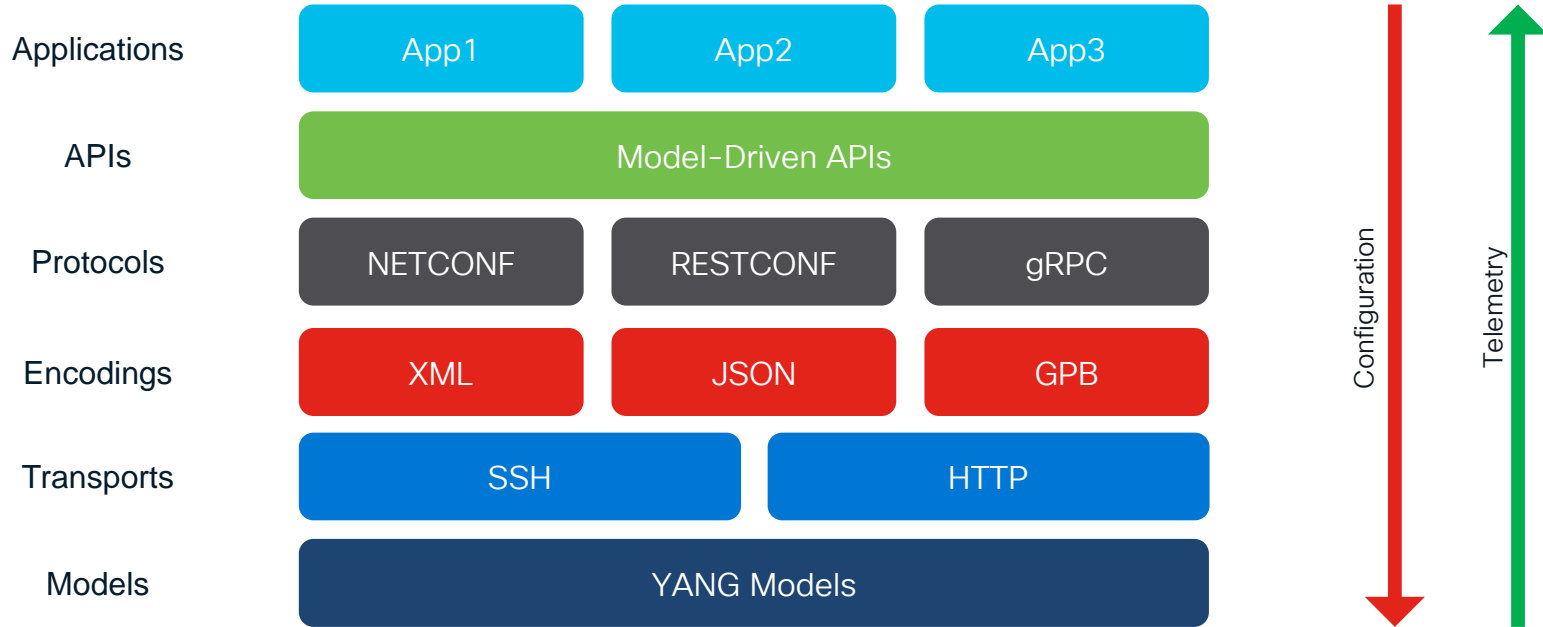
Focus

- Campus Automation and Orchestration
- Current focus on Model-Driven Programmability

Model-Driven Programmability



Model-Driven Programmability Stack



What is a Data Model?

A data model is simply a well understood and agreed upon method to describe "something".

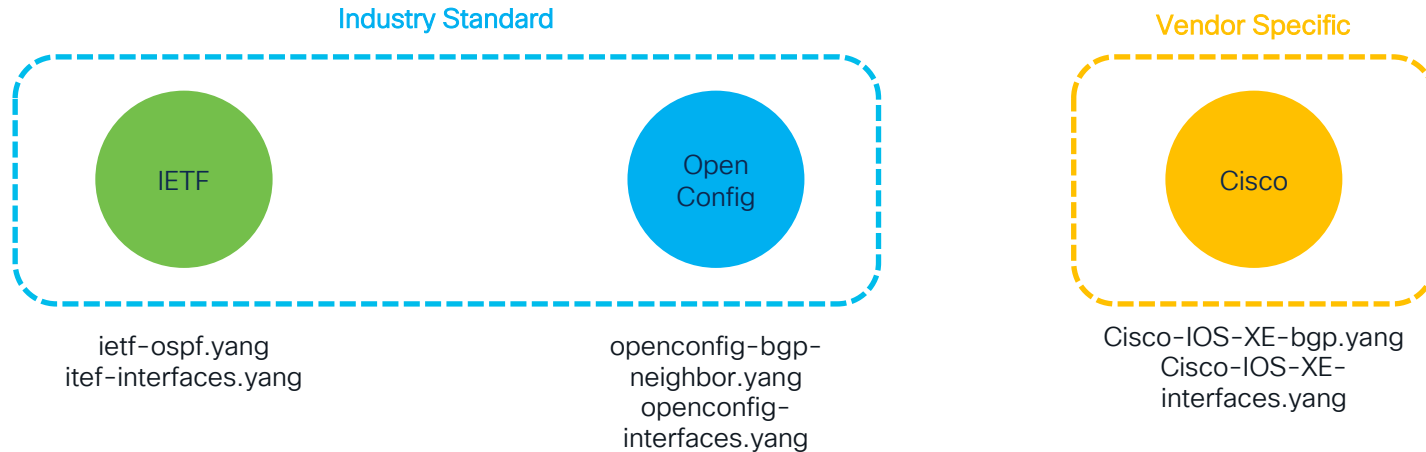
As an example, consider this simple "data model" for a person.

Person

- **Gender** - male, female, other
- **Height** - Feet/Inches or Meters
- **Weight** - Pounds or Kilos
- **Hair Color** - Brown, Blond, Black, Red, other
- **Eye Color** - Brown, Blue, Green, Hazel, other

Data Models and YANG

- Data Models
 - A data-models explicitly and precisely determines the structure, syntax, and semantics of the data which is externally available and visible.
 - Ensures completeness and consistency of interactions between systems and clients.



What does a YANG model look like?

```
module: Cisco-IOS-XE-native
  +--rw native
    +--rw default
      |   +--rw crypto
      |     +--rw ikev2
      |       +--rw proposal?          empty
      |       +--rw policy?            empty
    +--rw bfd
    +--rw version?                      string
    +--rw stackwise-virtual!
    +--rw boot-start-marker?            empty
    +--rw boot
      |   +--rw system
      |     +--rw tftp-path?             string
      |     +--rw tftp?                  string
      |     +--rw bootfile
      |       |   +--rw filename-list*   [filename]
      |       |     +--rw filename       string
      |     +--rw flash
      |       +--rw flash-list*          [flash-leaf]
      |       +--rw flash-leaf           string
    +--rw boot-end-marker?              empty
```

Edited for simplicity and brevity

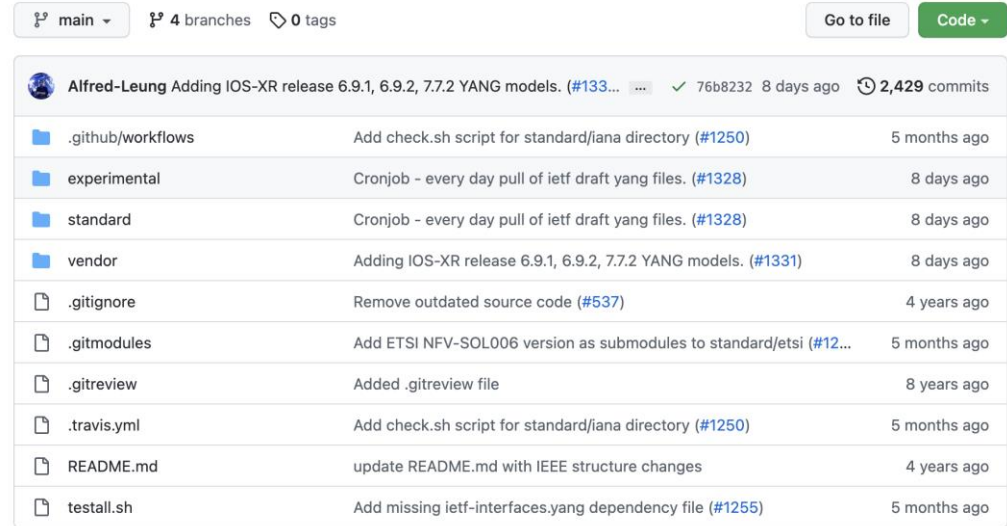
mbj4668/**pyang**












An extensible YANG validator and converter in
python



Where do you get Models?

YANG models (Vendor, IETF, and OpenConfig) available at
<https://github.com/YangModels/ietf>

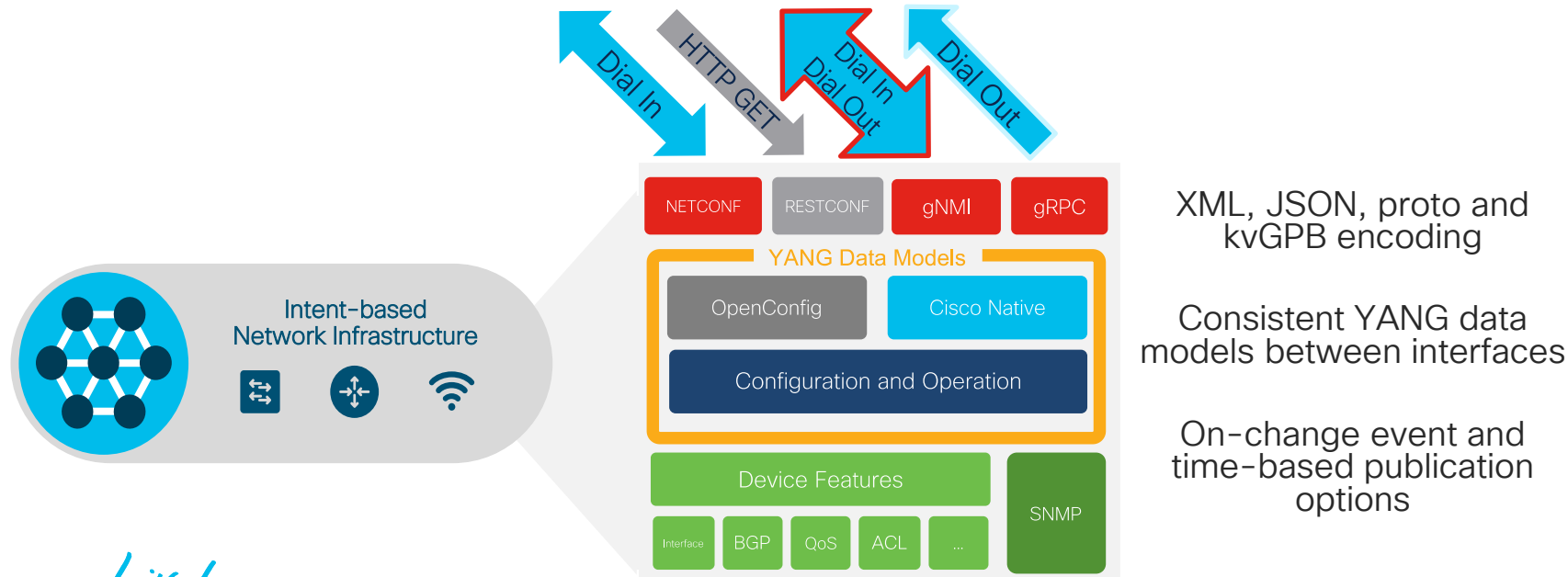


main 4 branches 0 tags			Go to file	Code
 Alfred-Leung Adding IOS-XR release 6.9.1, 6.9.2, 7.7.2 YANG models. (#133... 76b8232 8 days ago 2,429 commits				
	.github/workflows	Add check.sh script for standard/iana directory (#1250)	5 months ago	
	experimental	Cronjob - every day pull of ietf draft yang files. (#1328)	8 days ago	
	standard	Cronjob - every day pull of ietf draft yang files. (#1328)	8 days ago	
	vendor	Adding IOS-XR release 6.9.1, 6.9.2, 7.7.2 YANG models. (#1331)	8 days ago	
	.gitignore	Remove outdated source code (#537)	4 years ago	
	.gitmodules	Add ETSI NFV-SOL006 version as submodules to standard/etsi (#12...	5 months ago	
	.gitreview	Added .gitreview file	8 years ago	
	.travis.yml	Add check.sh script for standard/iana directory (#1250)	5 months ago	
	README.md	update README.md with IEEE structure changes	4 years ago	
	testall.sh	Add missing ietf-interfaces.yang dependency file (#1255)	5 months ago	

Model Driven Telemetry Interfaces

- ↔ Dial In: Collector establishes a connection to the device then subscribes to telemetry (pub/sub)
- ↔ Dial Out: Telemetry is pushed from the device to the collector based off configuration (push)

Publication / Subscription



Cisco YANG Suite



YANG Suite In Your Network



Learn and Browse

The core components of YANG Suite is an extensible plugin infrastructure used for testing and validating YANG RPCs and payloads.



NETCONF, gNMI & gRPC Telemetry

Interact using NETCONF protocol to network devices using YANG data models and payloads. Receive gRPC Dial-Out Model Driven Telemetry.



Interact with Devices

The YANG Suite File Manager works with SCP, Git, NETCONF, or local YANG files.



NETCONF, gNMI, and RESTCONF Programmability

Interact using the various protocols to network devices using YANG data models and payloads.



Migration to YANG

YANG Suite helps with migration from legacy interfaces to YANG.



Datasets and Diffs

The YANG Suite Analytics plugin provides easy transaction of the various metadata in YANG models.



YANG Set DevNet Sandbox Modules

Module(s)

Cisco-IOS-XE-interfaces-oper

Load Module(s)

NETCONF Operation

get

Device

sandbox-iosxe-latest-1.cisco.com

Edit Device

Open Device Window



YANG Tree



Replays

RPC Options...

Build RPC



Run RPC(s)

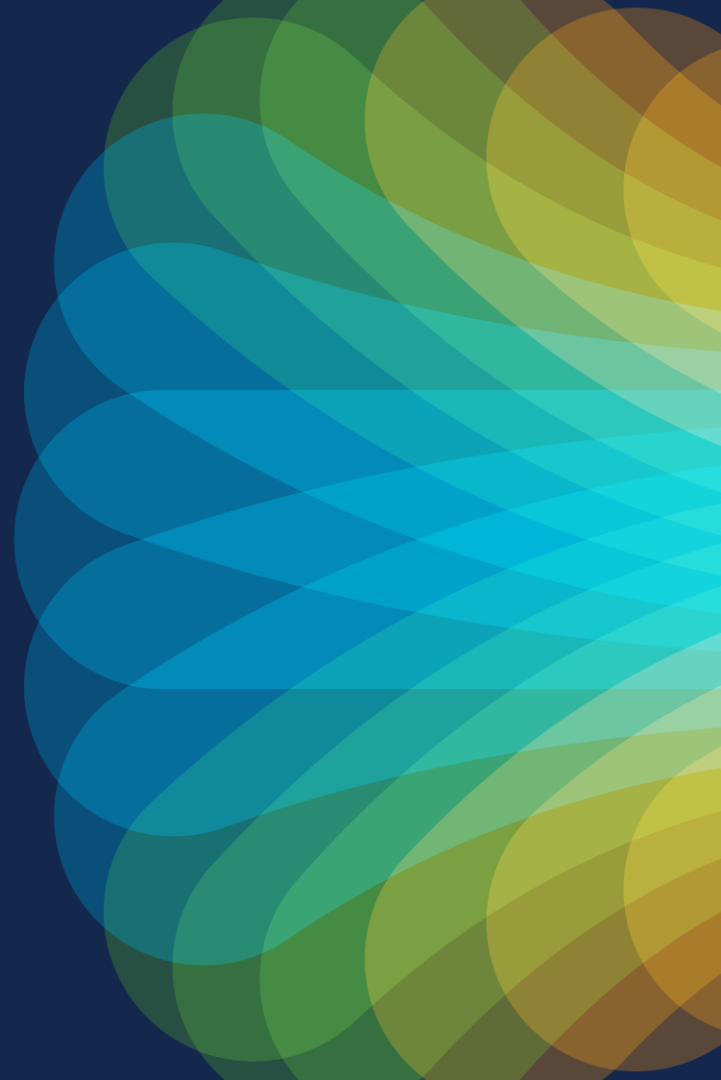


Clear RPC(s)

Nodes	Value
Cisco-IOS-XE-interfaces-oper	
interfaces	
interface	<input checked="" type="checkbox"/>
name	GigabitEthernet1
interface-type	
admin-status	
oper-status	
last-change	
if-index	
phys-address	
higher-layer-if	
lower-layer-if	
speed	
statistics	<input checked="" type="checkbox"/>
diffserv-info	
vrf	

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <get>
    <filter>
      <interfaces xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-interfaces-oper">
        <interface>
          <name>GigabitEthernet1</name>
          <statistics/>
        </interface>
      </interfaces>
    </filter>
  </get>
</rpc>
```

Using Yang Suite





The bridge to possible

Thank you

CISCO *Live!*

The background of the slide is a vibrant, abstract graphic. It features a large, stylized cloud shape on the left side, composed of overlapping, semi-transparent bands of color in shades of red, orange, yellow, and green. To the right of the cloud, a bright, multi-colored sunburst or starburst pattern radiates outwards, with colors transitioning from yellow and orange in the center to blue and green towards the edges. The overall effect is energetic and colorful.

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Let's go