



Cisco Community Meet The Author

Evolution of Overlay Networking with Victor Moreno

Victor Moreno

Distinguished Engineer

April 30, 2020



Welcome to the new “Meet Authors event”

Learn from the IT expert that literally wrote the books & content
“Learn more about the best practices and approaches to troubleshoot complex network problems”



Meet
Author



Learn the
Story behind

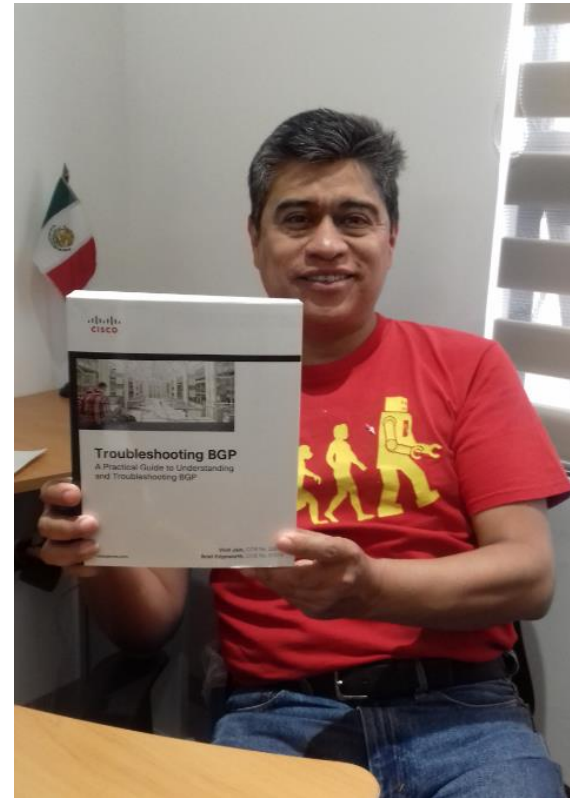


Trends &
Key Content



Clarify
Questions

Meet the Author raffle Lucky winner

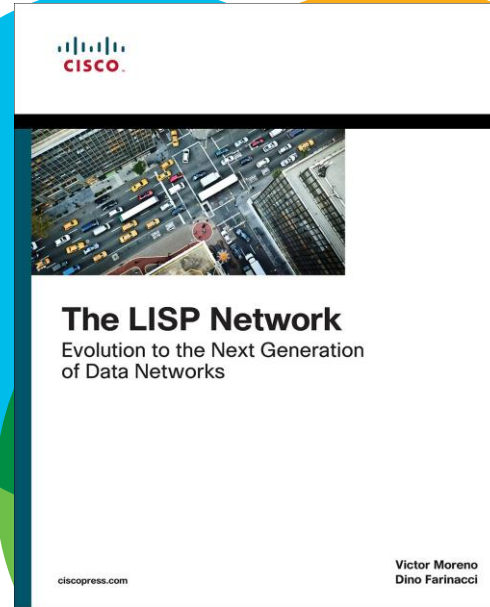


Congratulations “Ernesto Montiel”!

From “Vinit’s Jain event”

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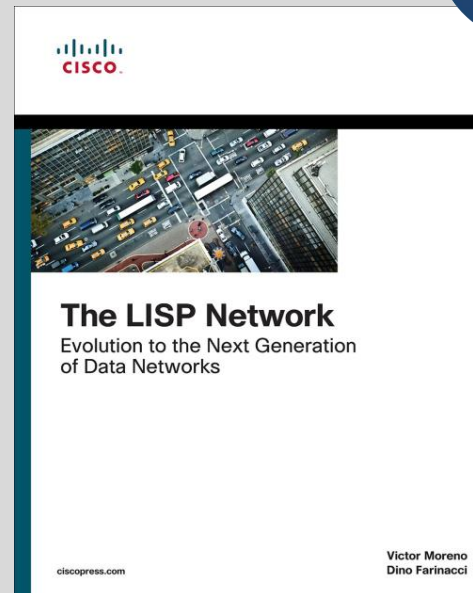
2 Free copies



Meet the Author



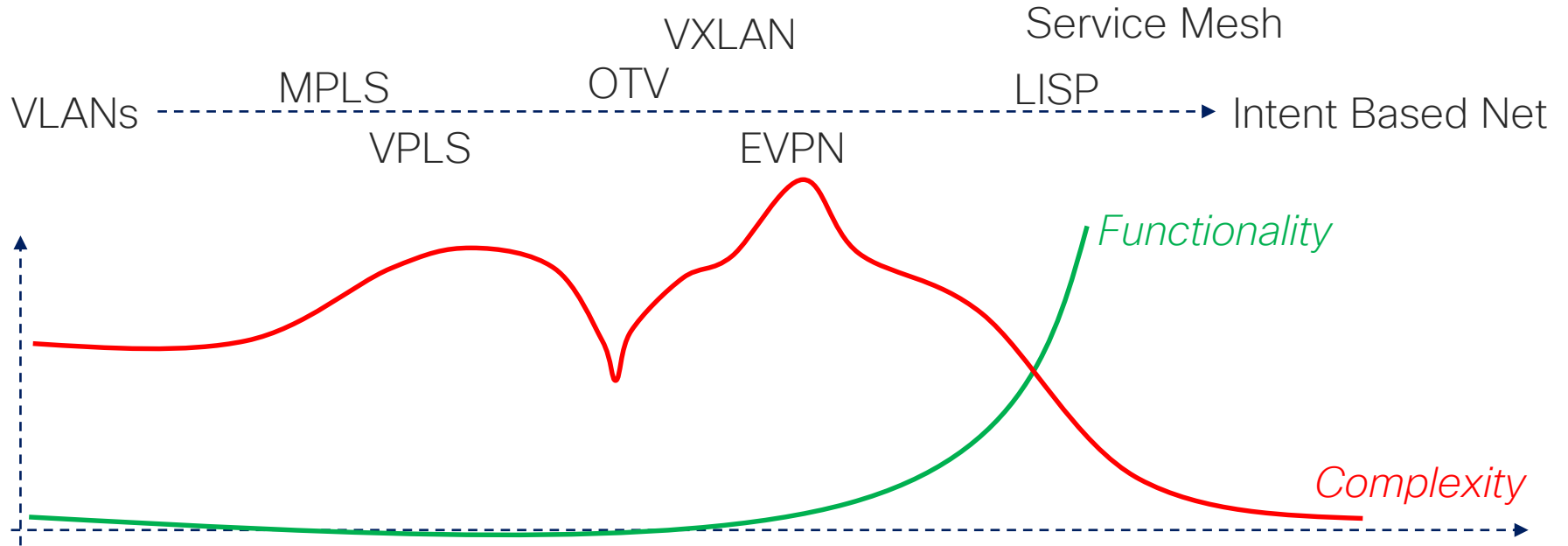
Victor Moreno
Distinguished Engineer



Distinguished Engineer, Speaker & Cisco Press author!

It's Victor's time!

From Segmentation to Abstract Intent Expression



Network Fabric Requirements and Implications

Requirements

- High Densities of End-points
- Mobility
- Segmentation
- Stack of Services: IP unicast, Multicast, Layer 2, NAT, Service Insertion, etc.

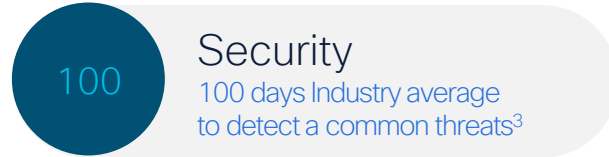
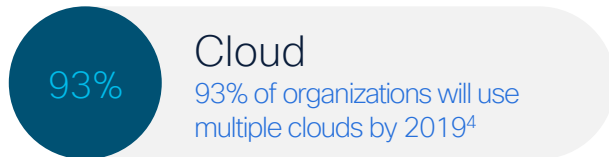
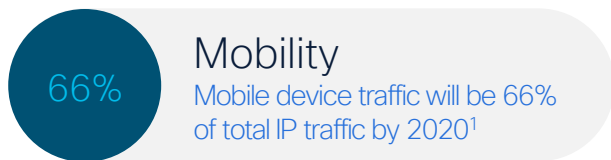
Implication

Scale

Performance

Simplicity: Consolidated Stack

Extensibility



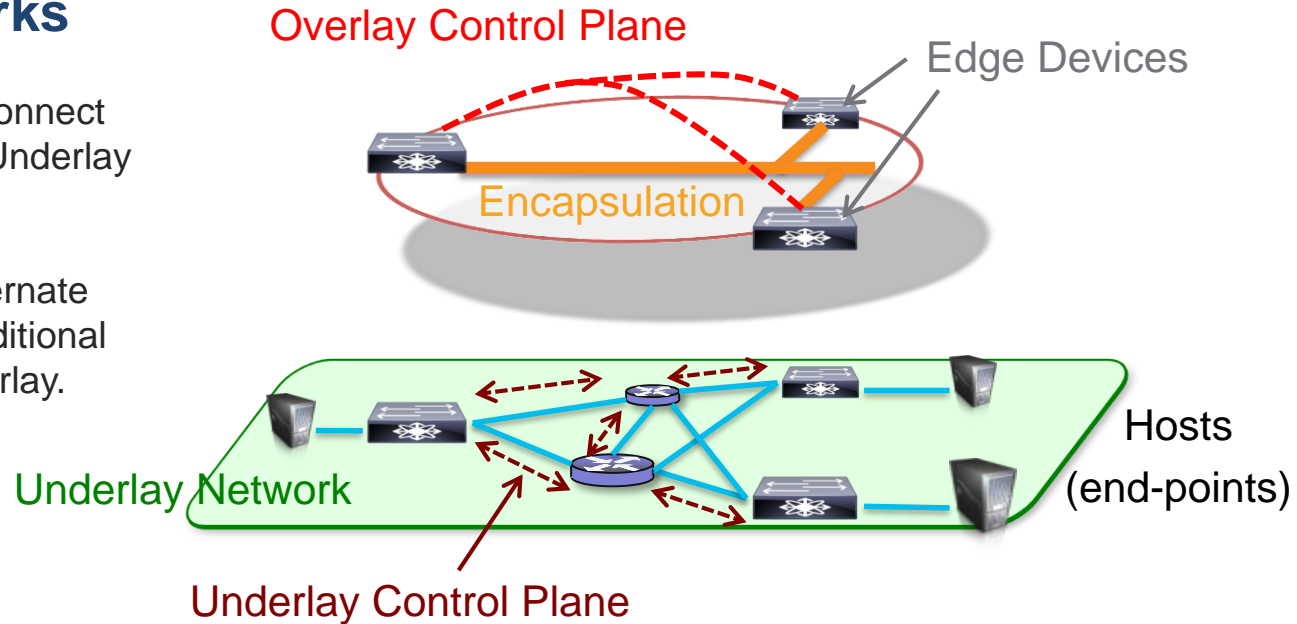
Overlay Virtual Networks

Control and Data Plane Separation

Overlay Virtual Networks

Logical topology used to virtually connect devices, built on top of a physical Underlay topology.

An Overlay network often uses alternate forwarding attributes to provide additional services, not provided by the Underlay.



Overlay Control Plane: Push vs. Pull

Push

- Routing Protocols (e.g. BGP)
- Distribute/push updates to all routers
- Run optimal path computation on all updates received

- Ideal for the underlay
 - Relatively static (infrequent changes)
 - Responsible for multi-path routing decisions
 - High computation requirement, distributes and calculates routes with reliable failover

Pull

- Mapping protocols (e.g. DNS, LISP)
- Updates are pulled only where needed
- No path computation, focus on Policy constrained lookups

- Ideal for overlay
 - Very dynamic (high rates of change)
 - Responsible for end-point attachment & policy driven services
 - Computationally nimble, updates and services queries to a database.

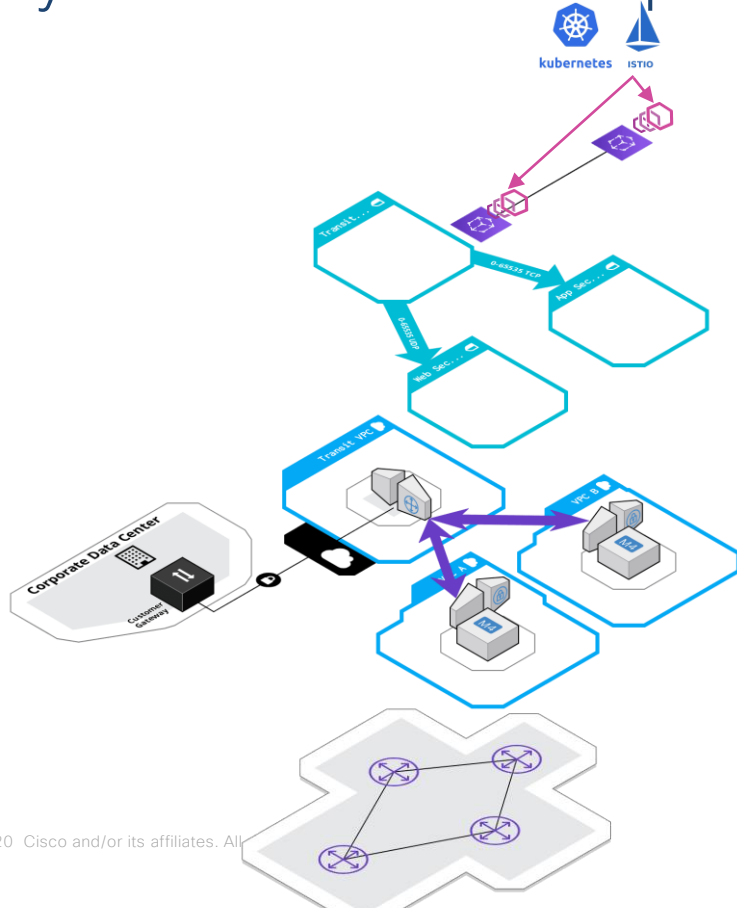
Network Protocol Consolidation

From multiple topics to one theme with variations

Networks have evolved organically:

- Some L2, Some L3
 - L2 protocols: STP, MLAG
 - First Hop Resiliency (FHRP): VRRP, HSRP
- Multicast: PIM ASM, SSM
- L2 extensions: VPLS, EVPN
- Traffic Engineering: RSVP, MPLS
- NAT
- An L3 Access removes the need for some of these (FHRP, L2)
- The remaining services can be provided by a single protocol stack
 - With a unified operational model: Registration and Resolution are unchanged and are the same for all services
 - It is all about mapping Identifiers to Locations. Not more, not less.
 - Where necessary additional semantics can be added to the mappings
 - Services are expressed as policies governing the responses provided.
 - Pulling allows the evaluation of flow context as part of the policy, it also allows us to scale policies

Layers of Network Operations in the Cloud



Application Service Mesh

- Interconnect container clusters
- Policy Based
- Controller to side-car

Access Control

- Instance level: Security Groups
- Subnet level: Network ACLs

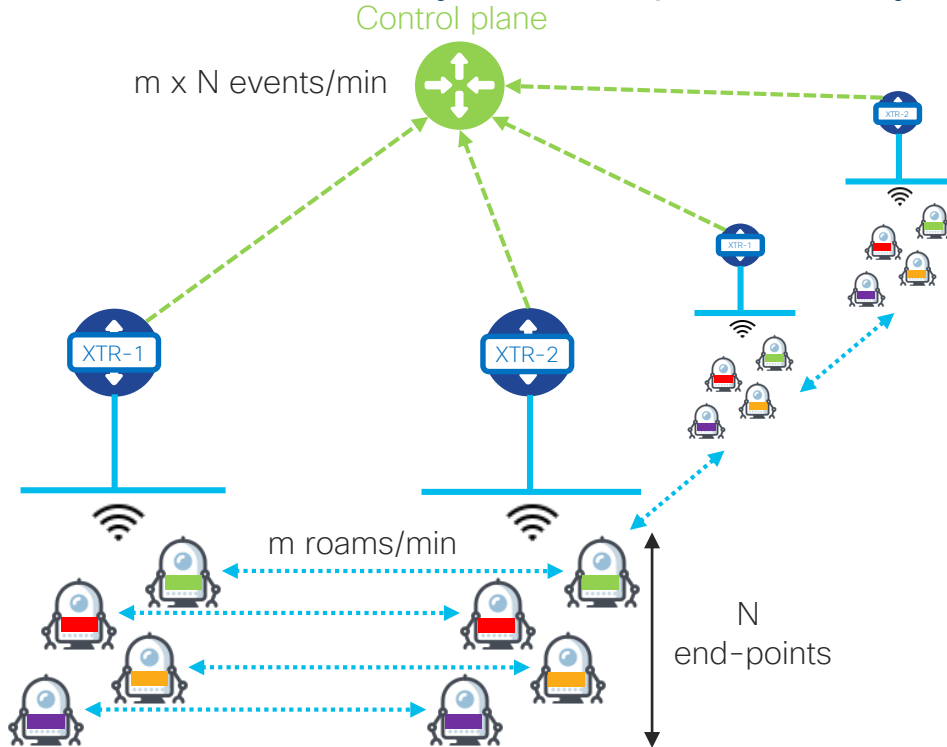
Cloud Connectivity

- Virtual Networks (VPC/VNET)
- Peering, Gateways, VPNs
- Load Balancers

Base Network Connectivity

Mobility in the Access

Rates of Mobility are compounded by end-point density

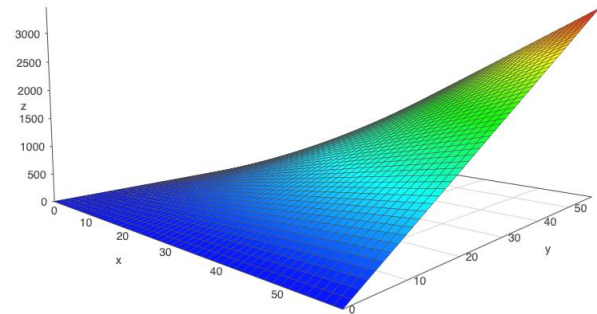


• Rate (@CP) = $m \times N$

• IoT example:

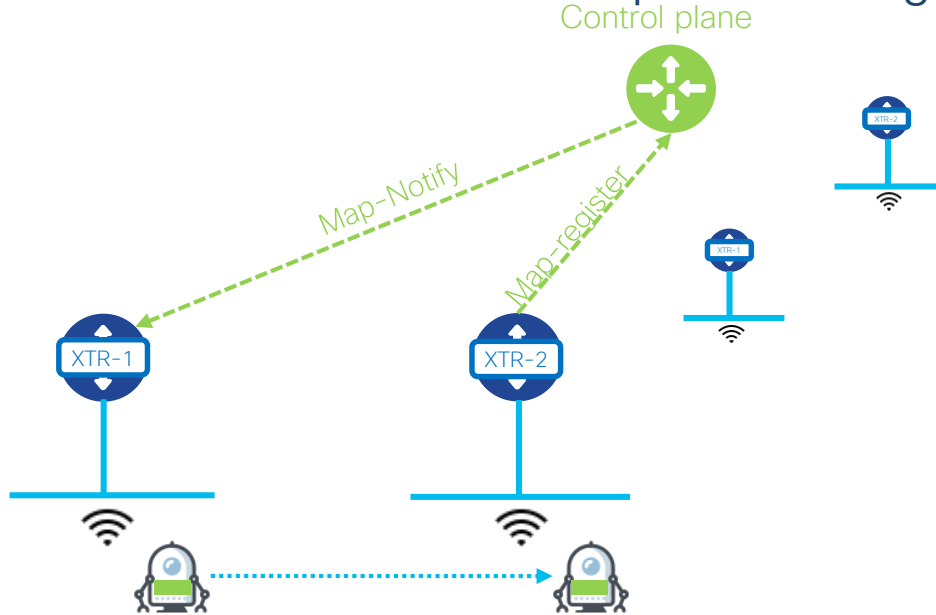
- 16K Robots, each moves 20 times/minute
- $20 \text{ r/min} \times 16\text{K} = 320\text{K r/min} = 5,333 \text{ roams/s}$
- Sub 70 ms convergence
- 64K Robots (21K r/s) 100K Robots (31K r/s)

• Stadium 64K@1r/min \rightarrow $\sim 1\text{K r/s}$



Mobility in the Access

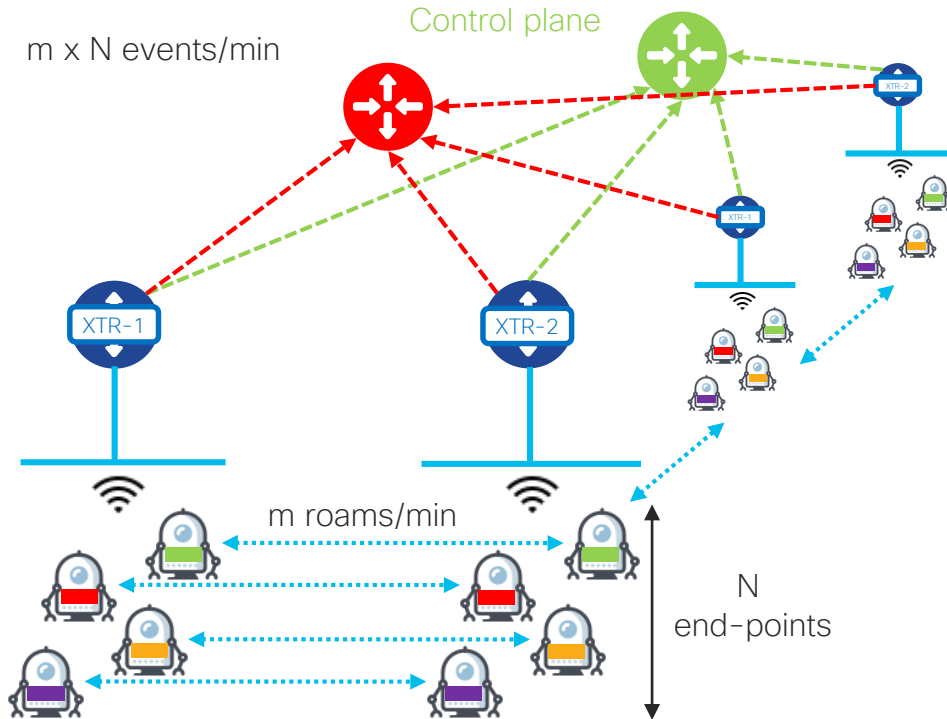
LISP Control Plane - Scoped move signaling



- Sparse signaling: Only the xTRs involved in the move
- Light processing: Only mapping updates, no path calculation
- The rate of events at the xTRs is a fraction of the total rate of events
- $\text{Rate@xTR} = (m \times N) / \text{number of xTRs}$
- IoT example
 - In a network with 100 access routers
 - $\text{Rate @xTR} = 5,333 \text{ r/s} / 100 = \sim 54 \text{ r/s}$

Mobility in the Access

LISP Control Plane – Horizontal Scale of the Control Plane



- Prefixes can be scoped to different control plane nodes
- Horizontally scale by adding nodes
- Tested performance for one control plane node:
 - Up to 800 r/s while converging faster than 70 ms
- IoT example:
 - $5,333 \text{ r/s} / 800 \text{ r/s} = 7 \text{ CP nodes}$

Submit Your
Questions Now!



Use the Q&A panel to submit your
questions, our expert will respond.

Extra Resources and References

Cisco Press News

The new study CCNP and CCIE Data Center Core DCCOR 350-601 Complete Video Course will be available soon! [[Learn more](#)]

Cisco Press -Cisco Certification Program Update

<http://www.ciscopress.com/promotions/new-cisco-certifications-142035>

Other useful resources:

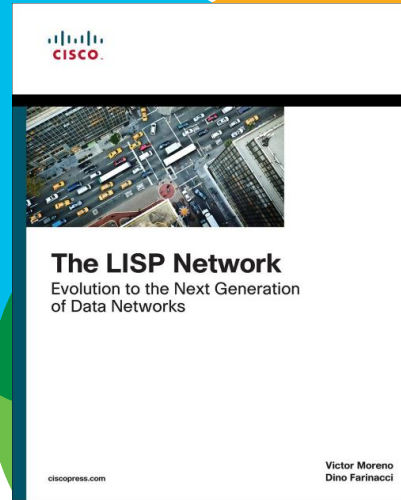
Cisco Enterprise Presents at Tech Field Day Extra at Cisco Live Europe 2020

<https://techfieldday.com/appearance/cisco-enterprise-presents-at-tech-field-day-extra-at-cisco-live-europe-2020/>

Victor's publications

<https://www.ciscopress.com/authors/bio/eda7ea44-92c4-4334-8c1e-569913502b00>

Congratulations
winners!



We'll contact you via email

Thank you for Your Time!

Please help to complete the survey

Your opinion is important and help us to improve



Thanks For Joining today!

