Closed-loop automated operation for network deployment and operation

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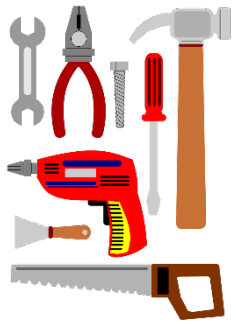
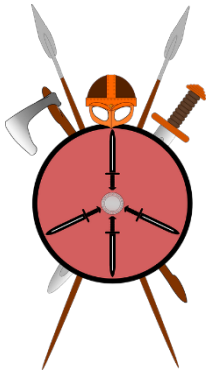
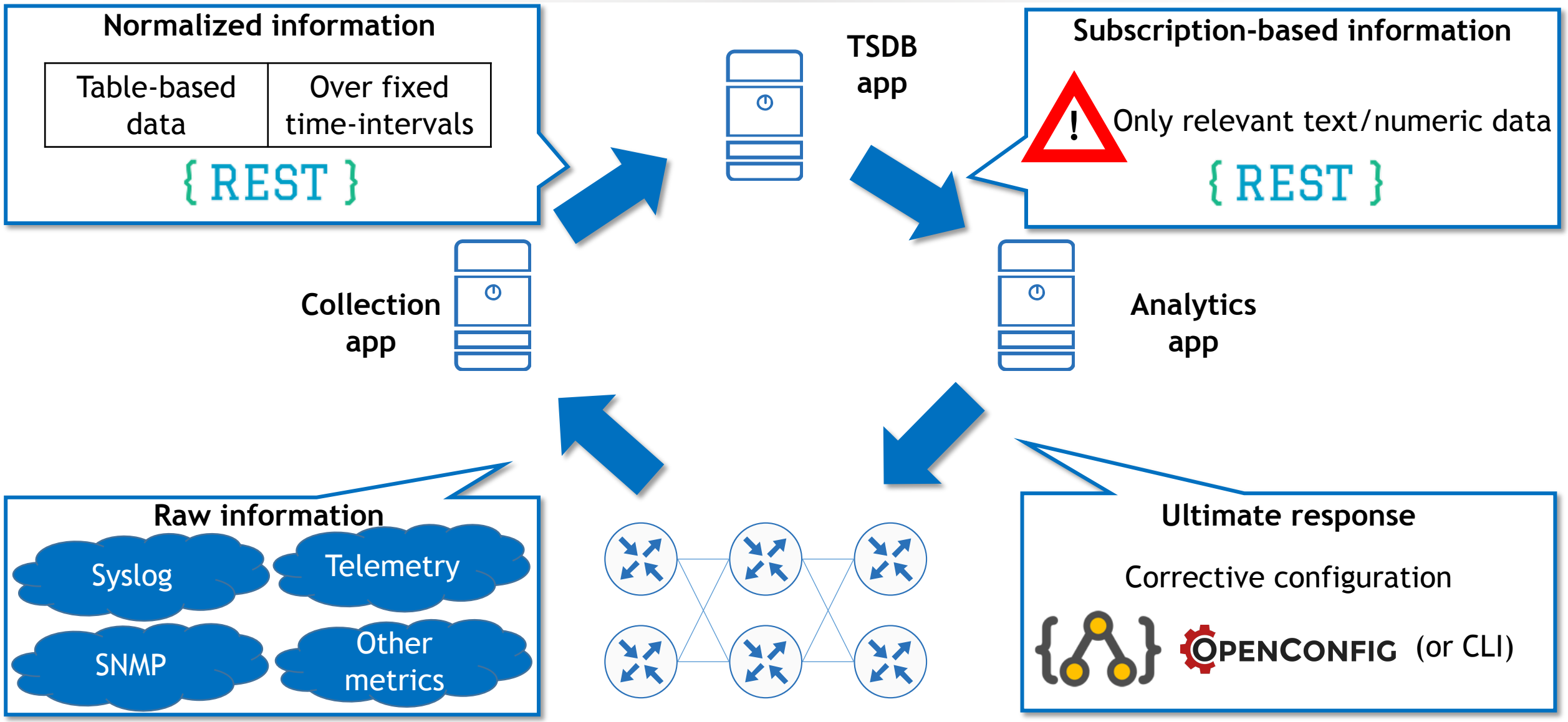
What functionality do we need in the network?

Fault management	Configuration management	Accounting management	Performance management	Security management
Automated failure analysis and check lists launched on conditional events	Automated vendor-agnostic full-blown device provisioning (day zero and day one)	Automated customer session's management based on real-time data	Automated network configuration changes based on real-time data and predefined thresholds/ patterns	Automated network configuration changes based on the security events and config baseline enforcement



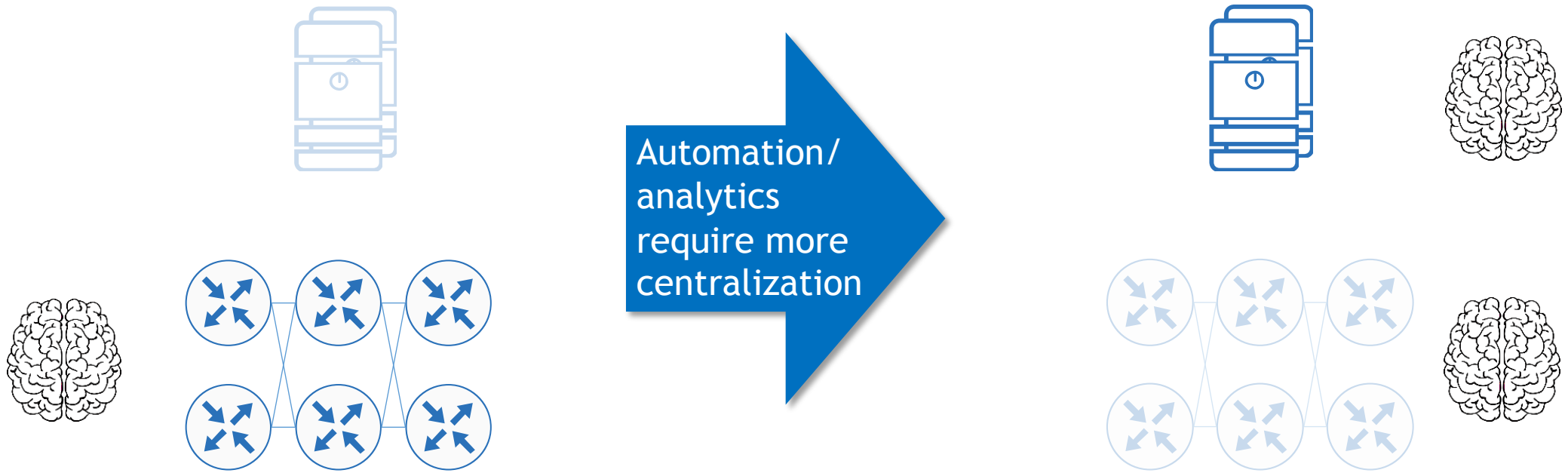


What is the generic workflow for closed-loop automation?



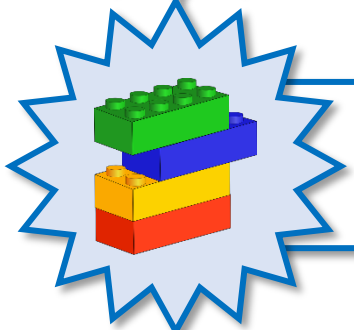
How does this workflow affect network?

Distribute what you can, centralize what you need

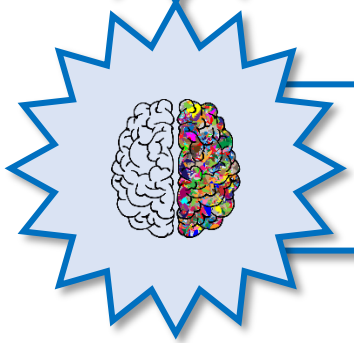


What are the corner stones to build such a system?

What? Use open-source tools for IT/network management, monitoring, automation
Why? Easy to understand, community support, secure

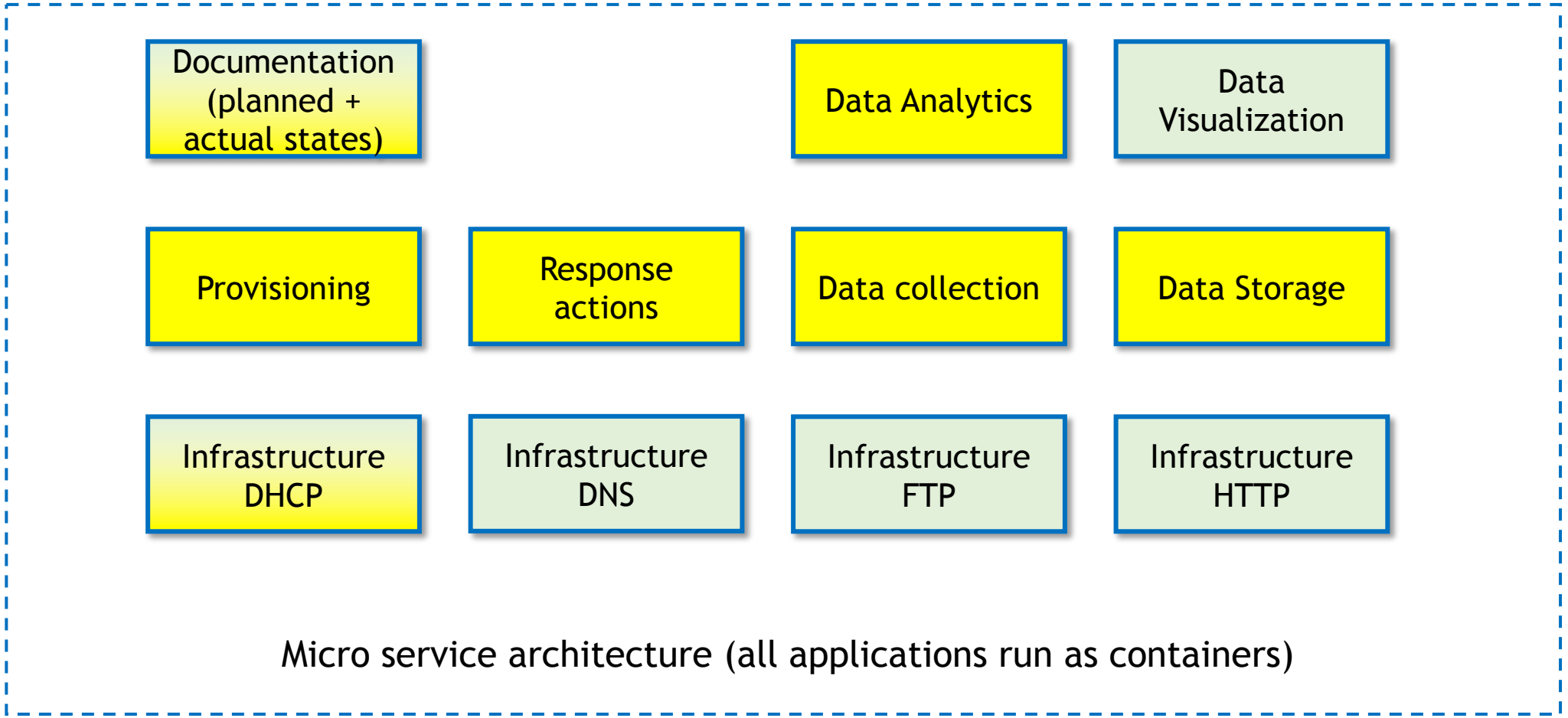


What? Use micro service architecture for your network management stack
Why? Clear boundaries between functions, easy to upgrade/replace, easy to scale



What? Focus on functionality, applicability to your use cases and integration
Why? Functionality not vendors matters, your operational processes are unique

What is the high-level architecture for such a system?

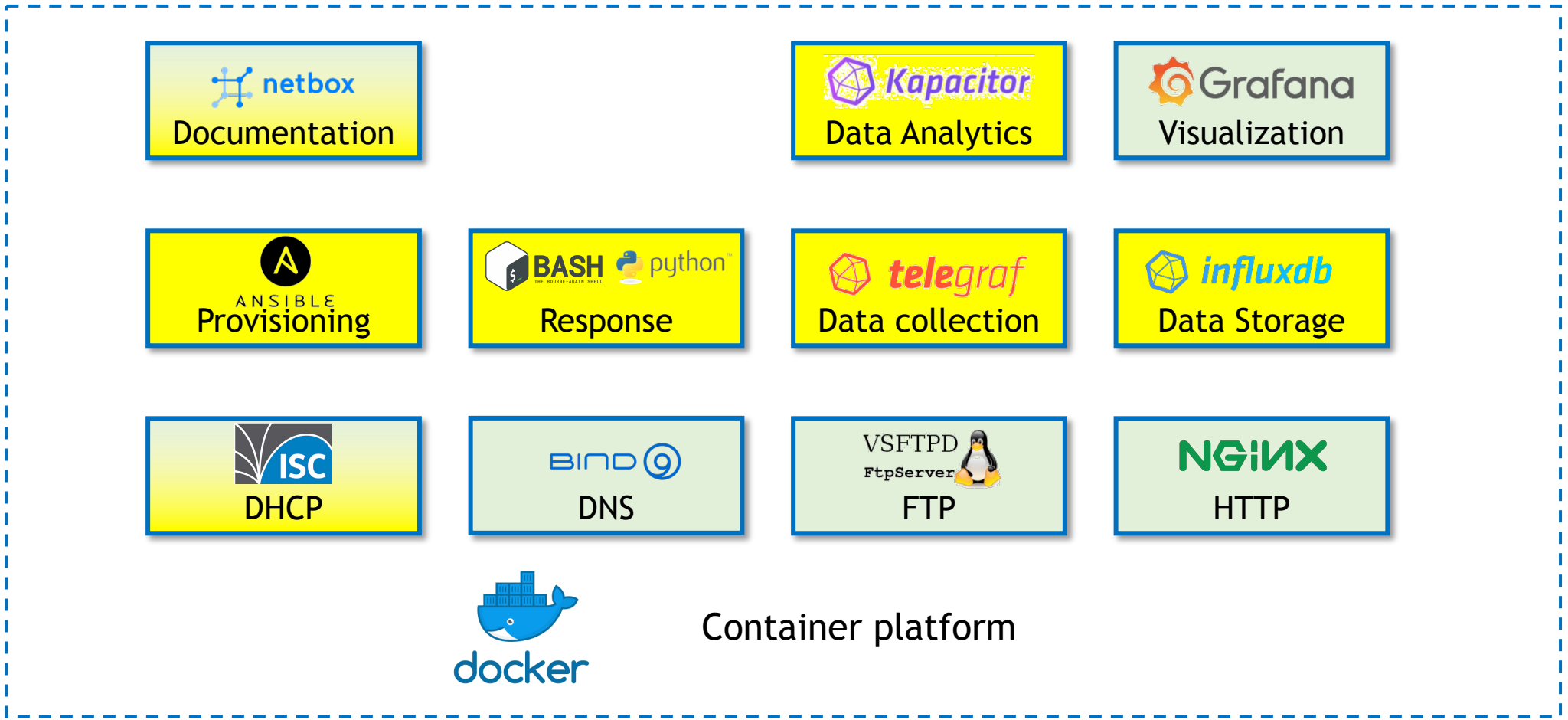


CLA*-related app Other** app

*CLA – closed-loop automation

**Apps from the Data Centre Fabric (https://github.com/akarneliuk/data_center_fabric)

What components have we chosen?



Use-case #1: ZTP extended with CLA

Traditional ZTP

What you get:

- Management IP (OOB) over DHCP
- Hostname
- Basic configuration (AAA, SNMP, Syslog)

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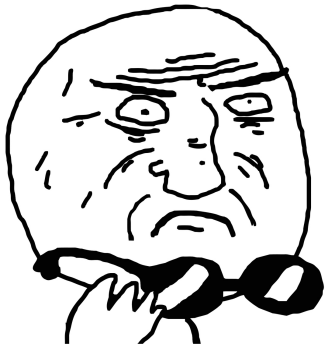

What makes difference

ZTP + CLA

What you get:

- Full configuration (All interfaces, routing, services, ACLs, etc)

Use-case #2: Automated failure analysis

Traditional failure analysis

What you do:

- Connect to the device with failure condition (or adjacent one)
- Collect the info about the failure
- If customers' affecting: fix the issue if possible
- Perform the analysis and do the actions

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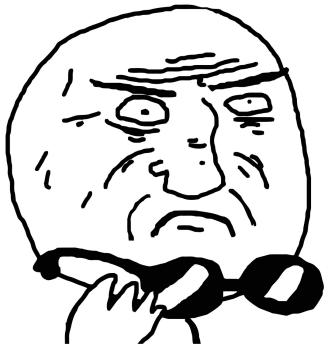
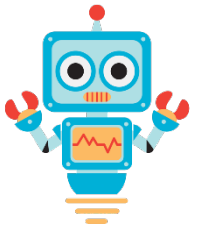


What makes difference

Automated failure analysis

What you get:

- All the relevant information is collected automatically and analysed automatically (based on the logic you predefine)
- Automated restoration action could be applied based on analysis



Use-case #3: Automated trending analysis

Traditional trending analysis

What you do:

- Analyse the statistics out of the existing NMS/monitoring tools
- Based on the analysis you do something (plan network expansion, plan traffic engineering tunnels, etc)

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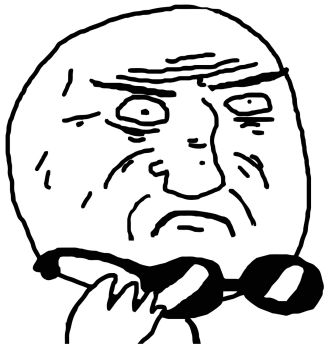


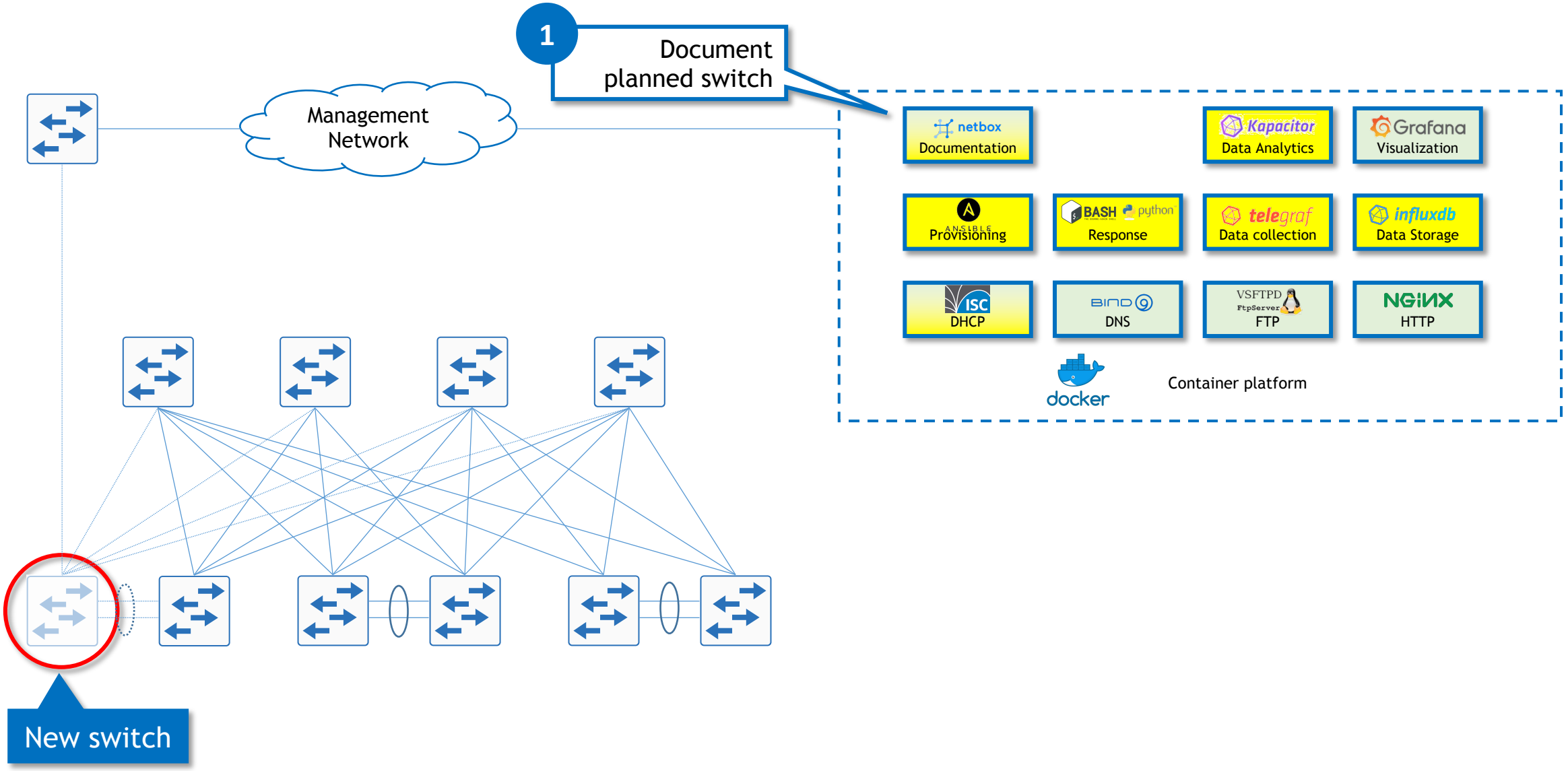
What makes difference

Automated trending analysis

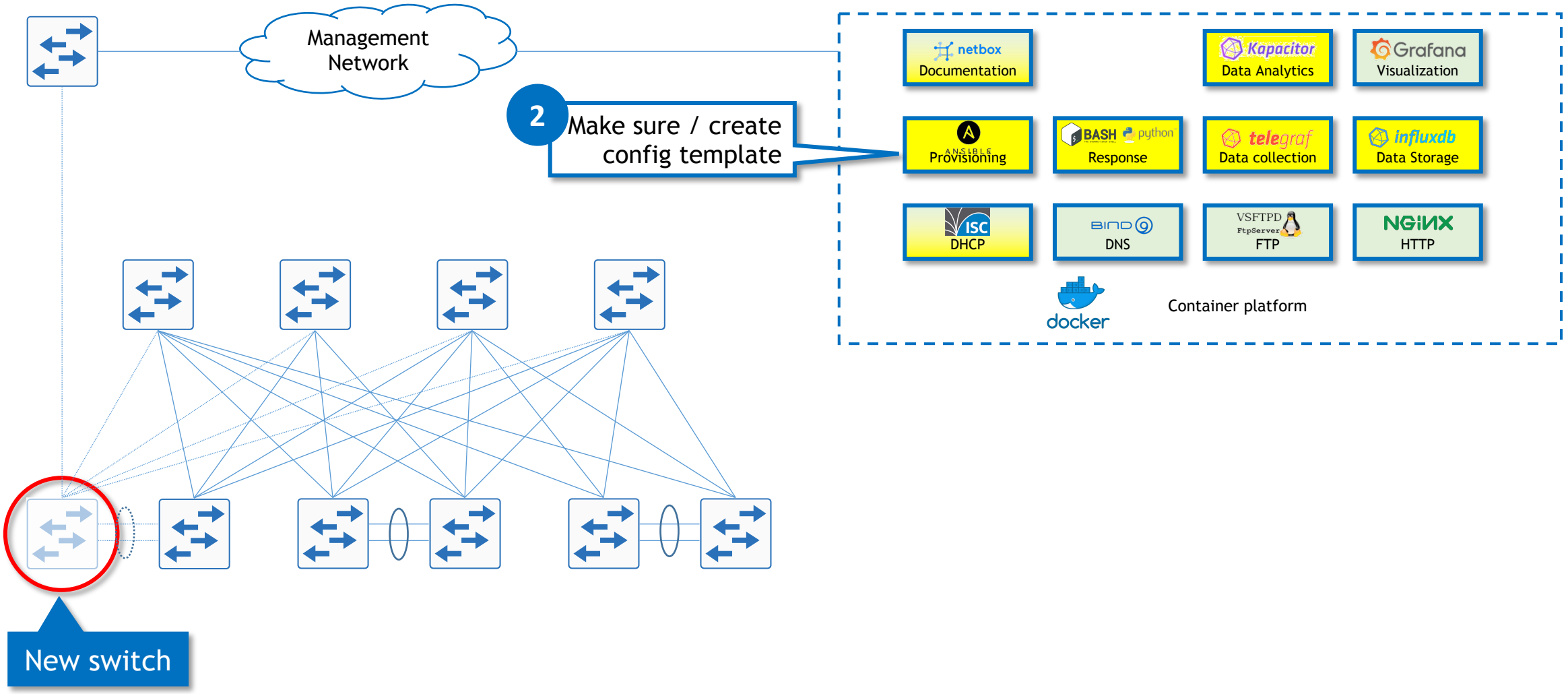
What you get:

- Analyse network utilization based on your logic (samples, aggregation, etc)
- Perform automated actions based on the thresholds/trends

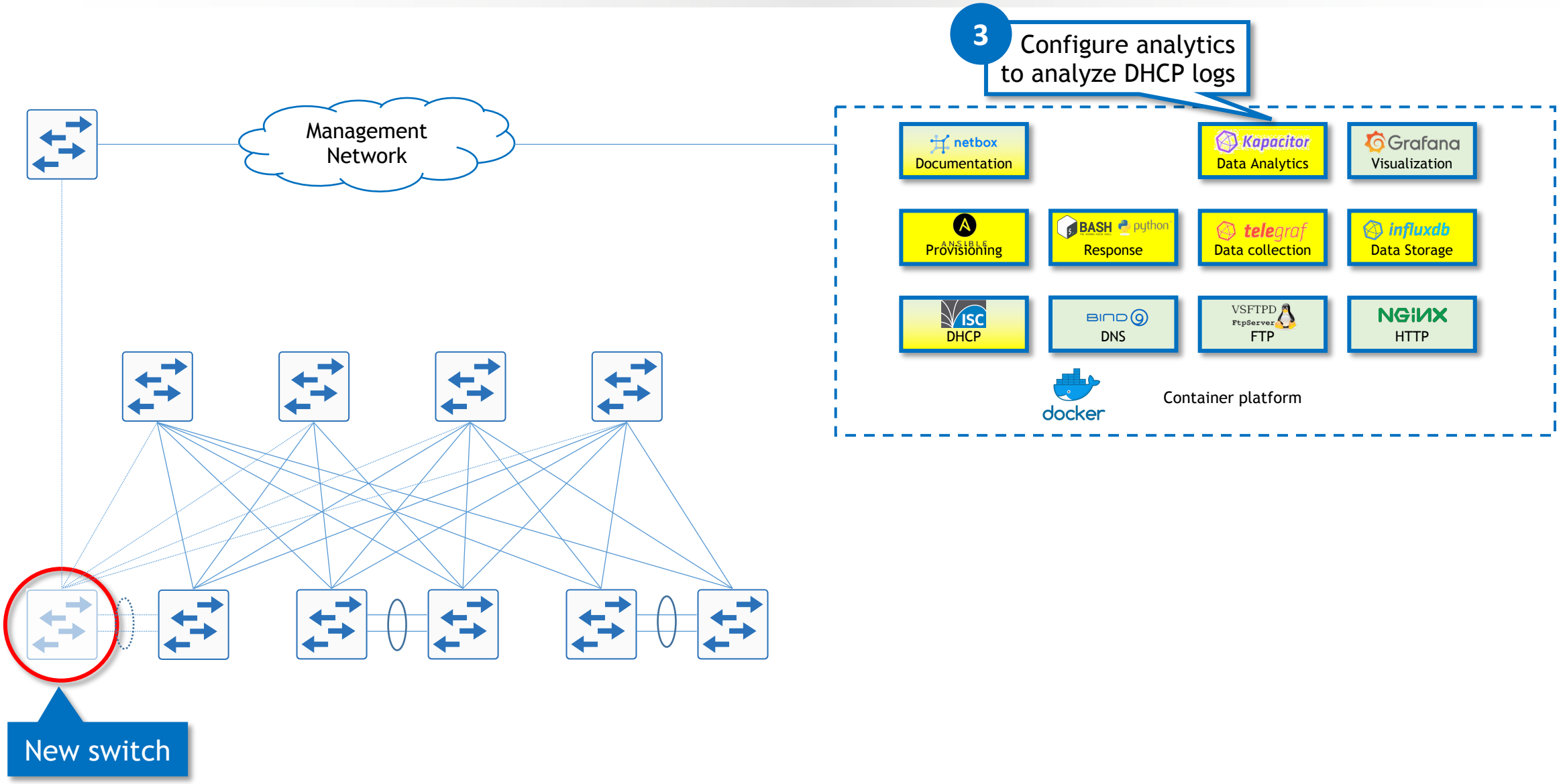
Full-blown zero-touch provisioning using CLA - prep (1)



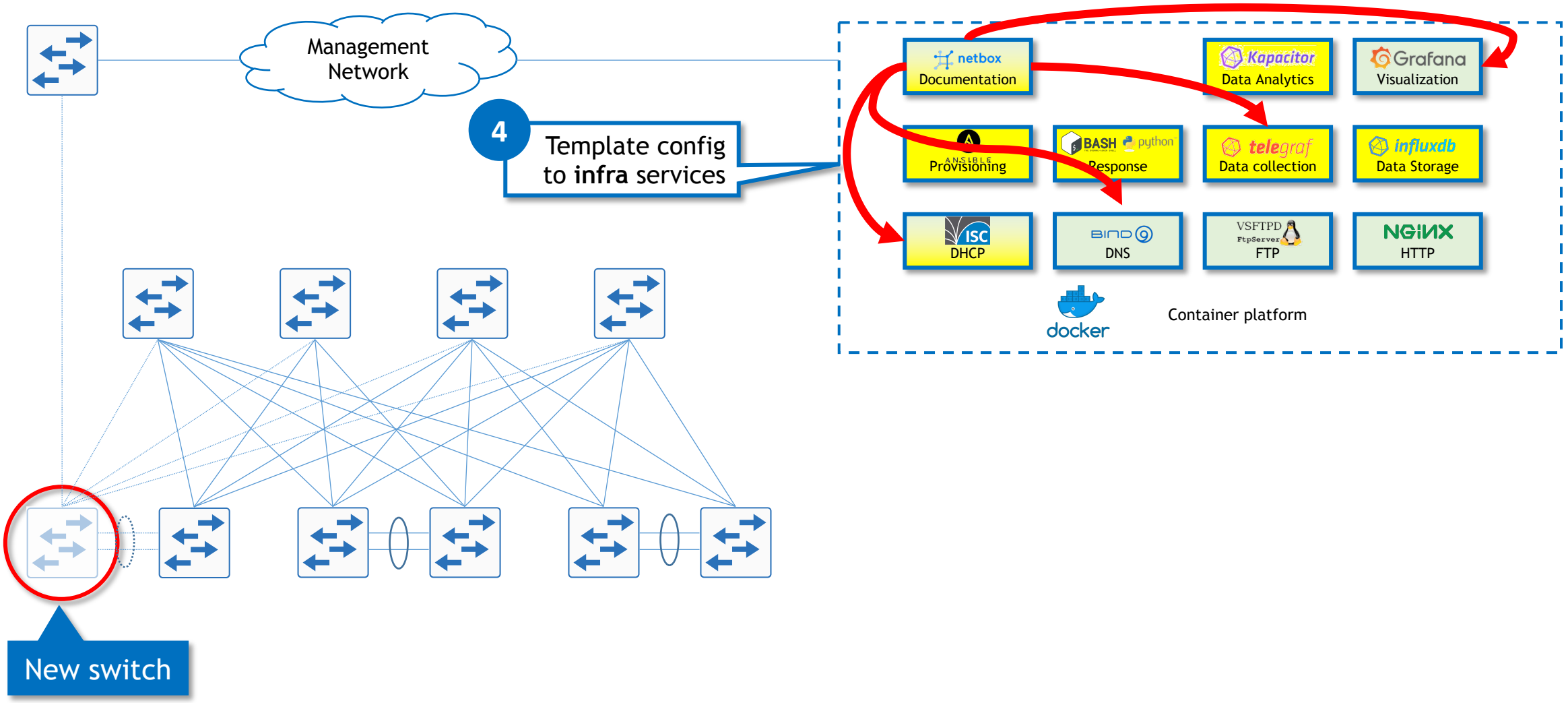
Full-blown zero-touch provisioning using CLA - prep (2)



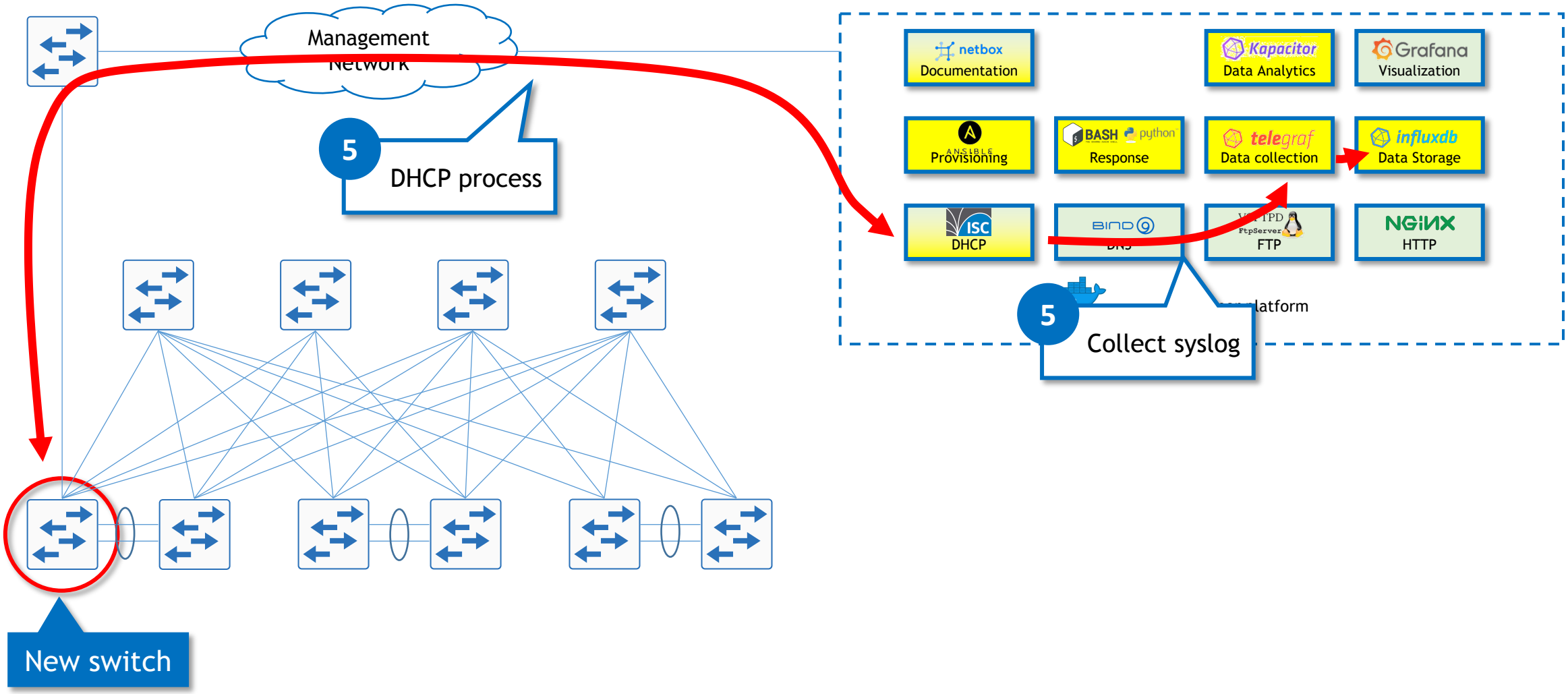
Full-blown zero-touch provisioning using CLA – prep (3)



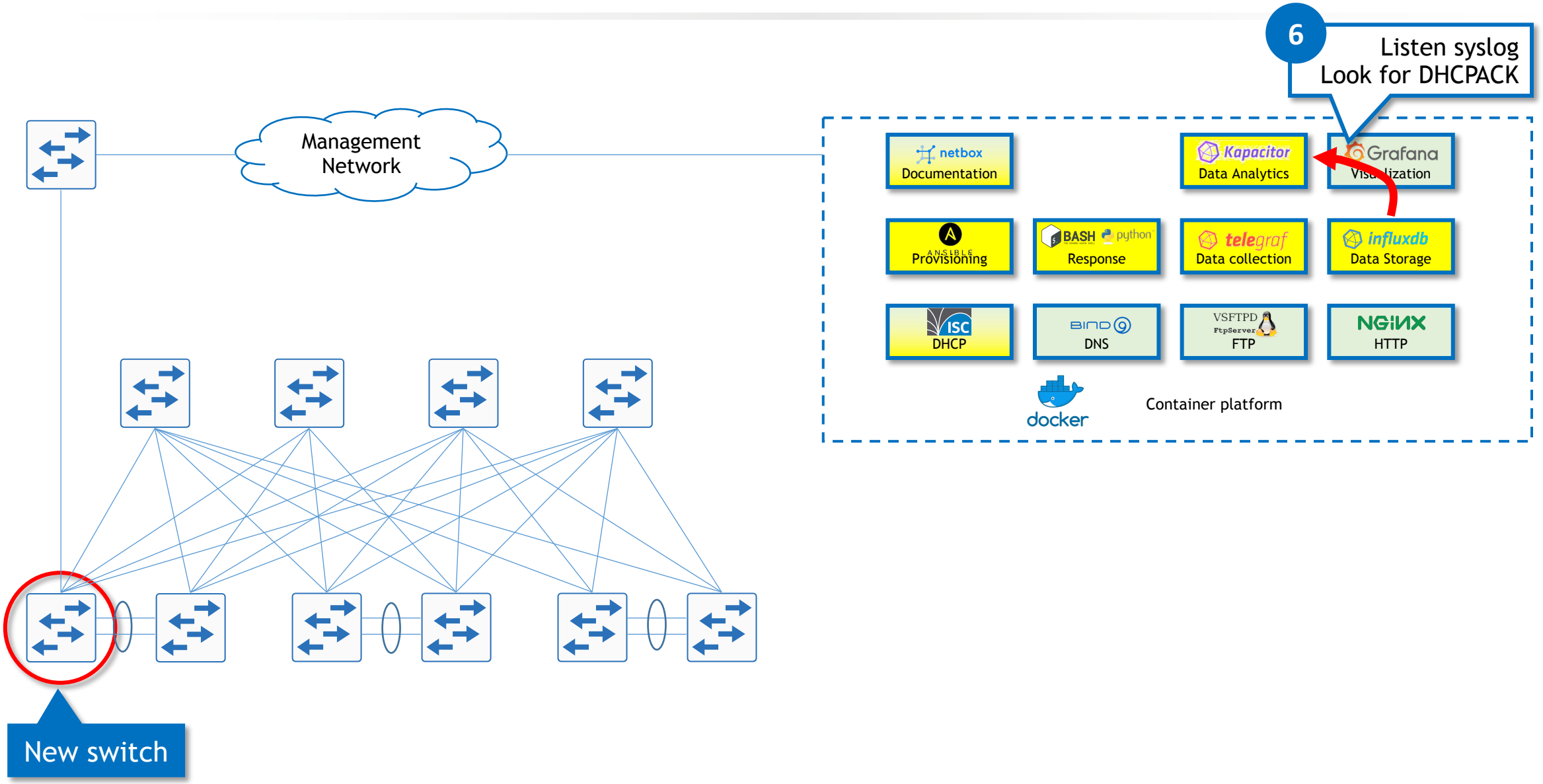
Full-blown zero-touch provisioning using CLA - prep (4)



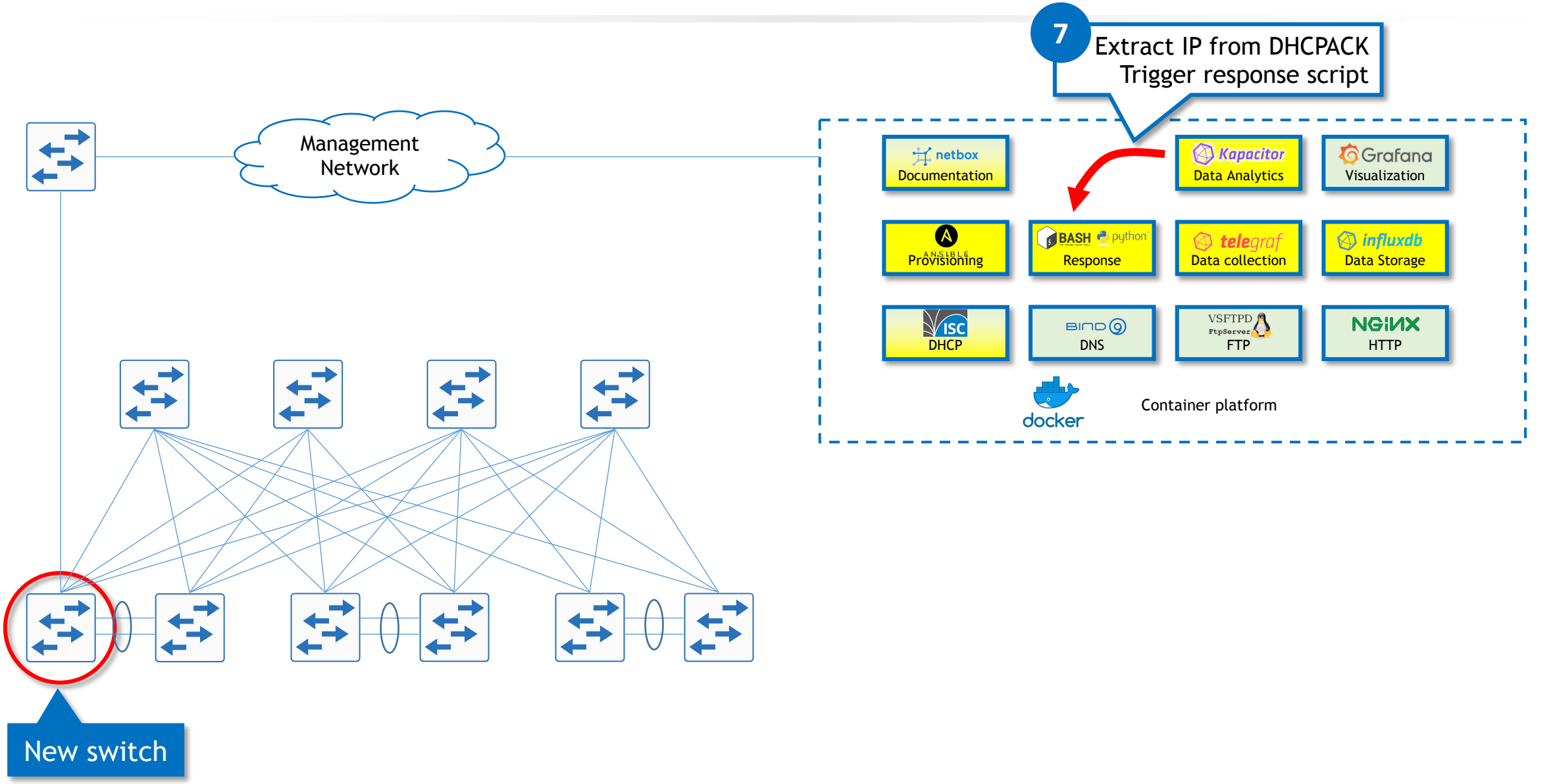
Full-blown zero-touch provisioning using CLA – run (5)



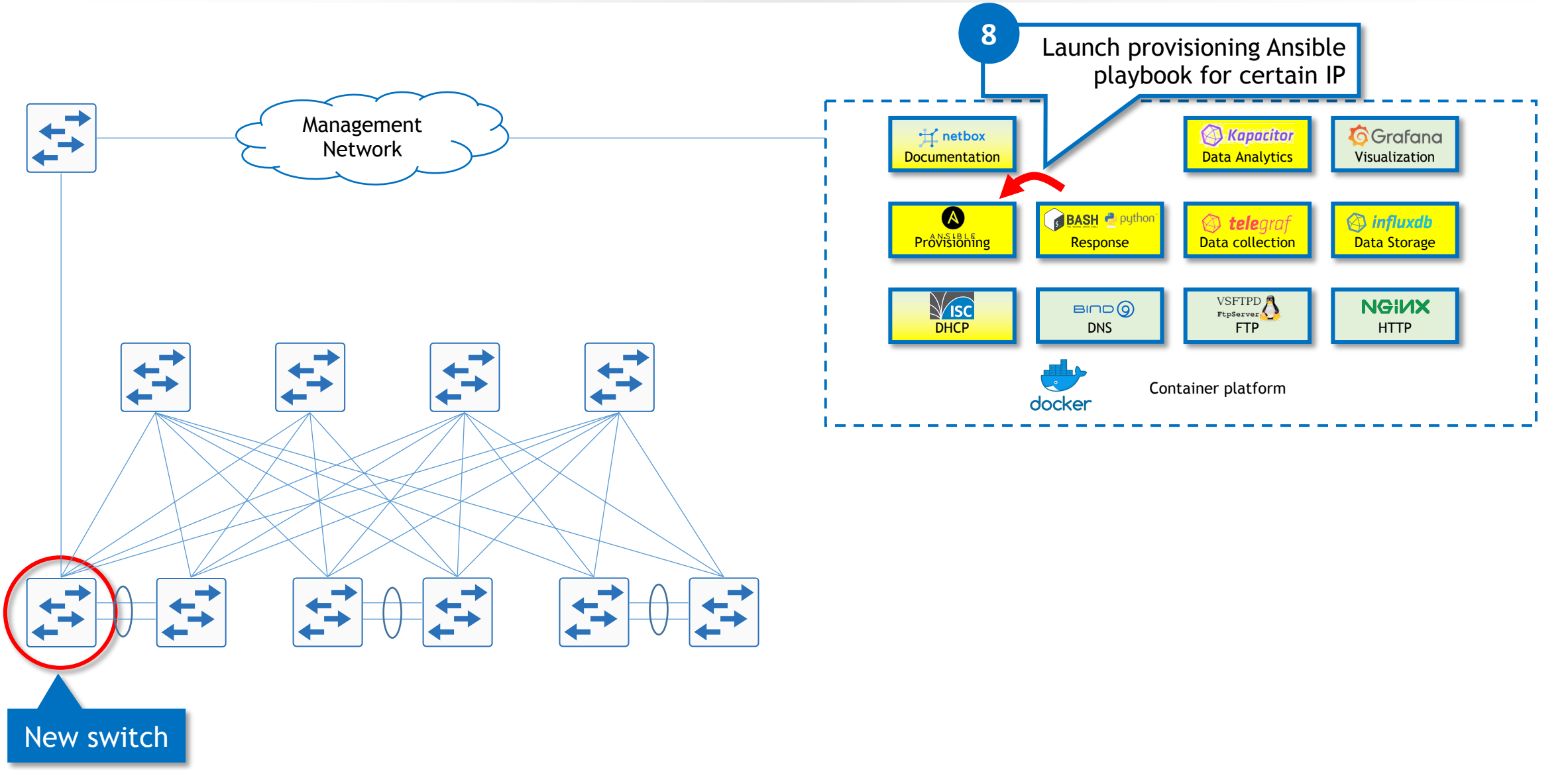
Full-blown zero-touch provisioning using CLA – run (6)



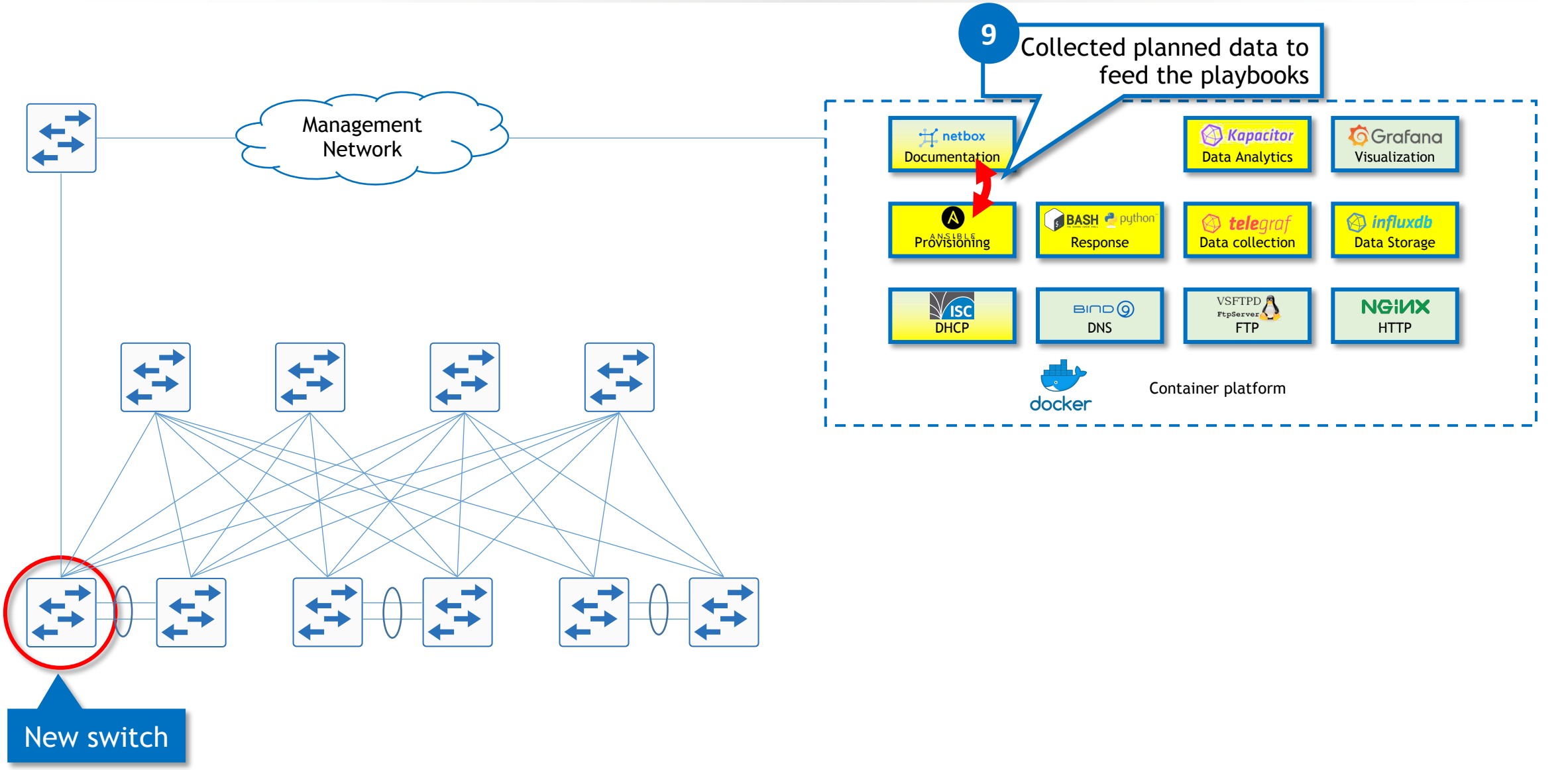
Full-blown zero-touch provisioning using CLA – run (7)



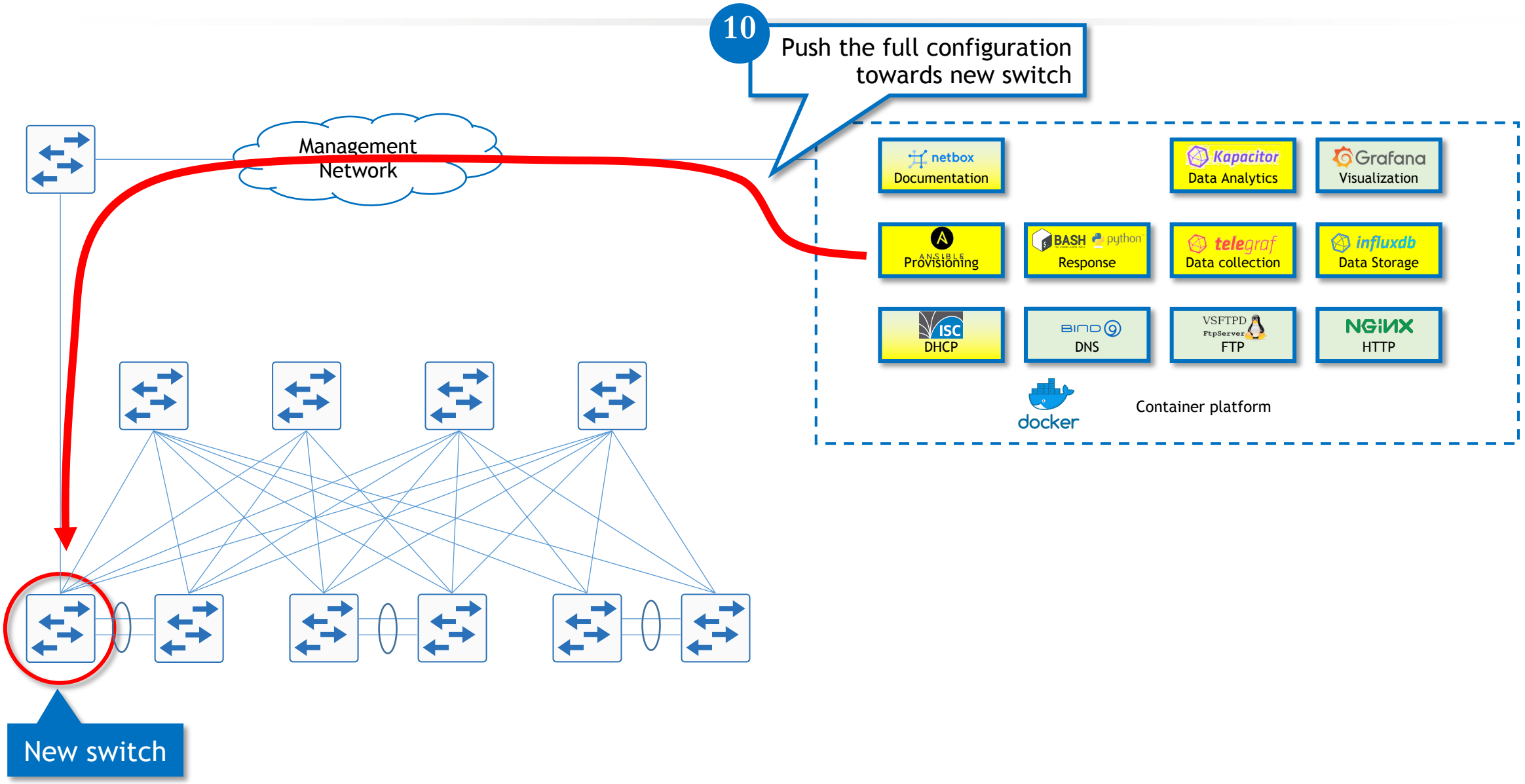
Full-blown zero-touch provisioning using CLA – run (8)



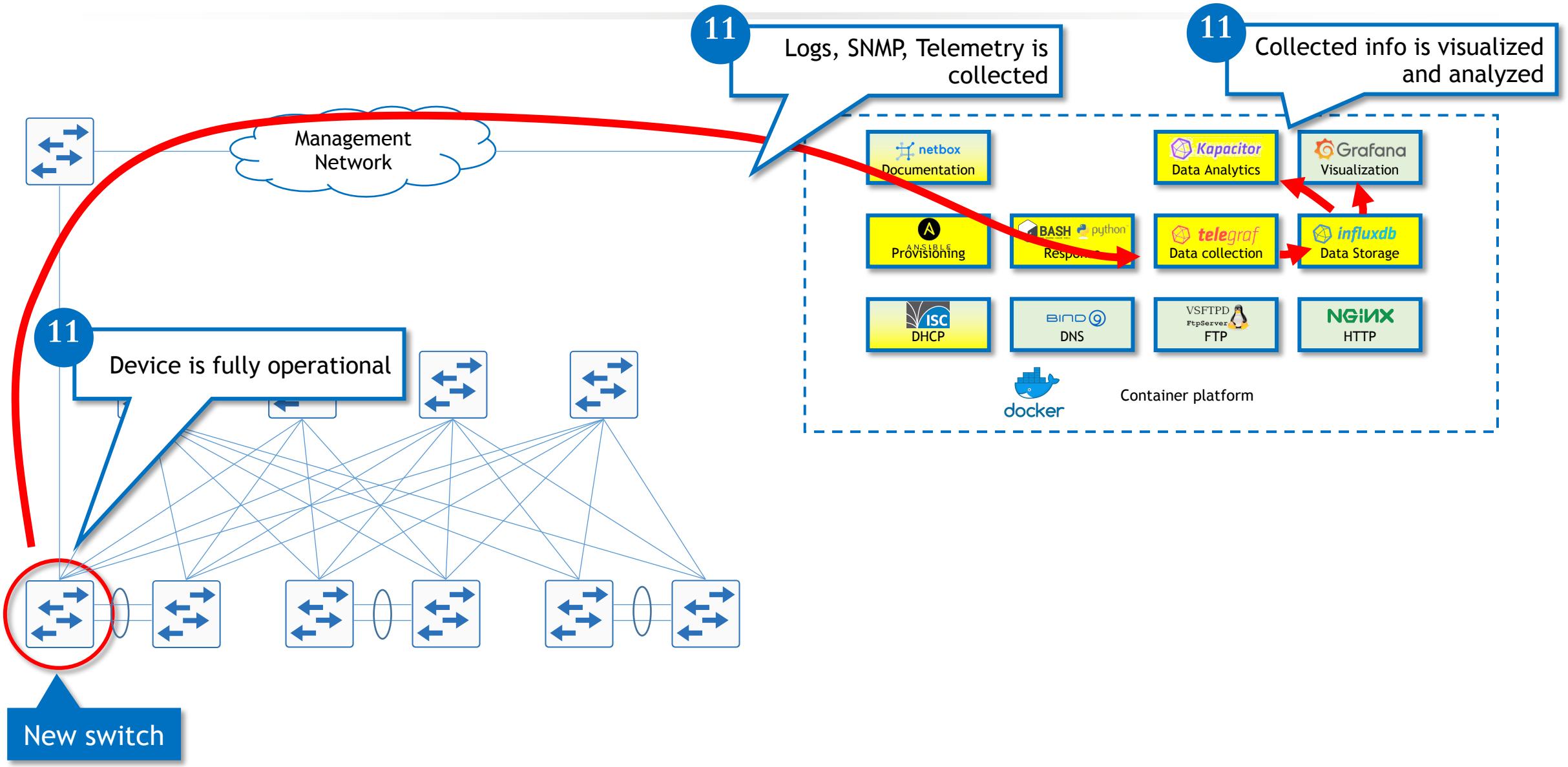
Full-blown zero-touch provisioning using CLA – run (9)



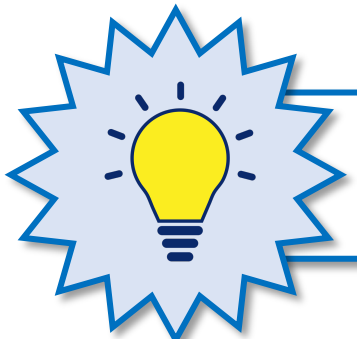
Full-blown zero-touch provisioning using CLA – run (10)



Full-blown zero-touch provisioning using CLA – run (11)



Further steps



Develop your business logic based on Operations skills and network behaviour

Understand which information you need to make a proper decision (regardless automation)

Deploy data analytics and response scripts for closed-loop automation

All in all …

… it is just automation of your knowledge

Thank you very much for your attention!

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Backup

About karneliuk.com

Brief description

In industry: since 2007
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Speaker: Cisco Live 2019, SReXperts 2019
Author: Network Programmability and Automation, Volume 1, Cisco Press
Awards: #CiscoChampion 2019 as one of the top tech influencers world-wide

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