

# The Role of Digital Twins in the Era of 5G: Ensuring Security and Compliance

Presented by: Ian Carpenter



16/10/2023



# THE NEED FOR CONTINUOUS SECURITY TESTING

- ✓ There are a myriad of protocols across 3G, 4G, 5G, MC-PTT, IMS, IoT
- ✓ Service Providers need to regularly run security tests against Network Functions, not just once a year or accept the vendor's internal results
- ✓ When vendor patches are released there needs to be a method of testing in a realistic network environment, not just unit tests
- ✓ Operators are under pressure to perform security testing, but using the live network creates a high level of risk.
- ✓ Unfortunately, many operators must weigh the risk of live network testing versus doing nothing, which brings uncertainty.
- ✓ Some testing teams test certain modules of the network, but that provides only a narrow picture.

***Businesses need a comprehensive, simulated version of the live network where tests across the spectrum of security (attack, detection & mitigation tools), load and compliance can be verified without impact to the live network.***

# CHALLENGES

- ✓ Its challenging because ...
  - ✓ There's a growing complexity but its also getting harder for organizations to have deep & wide protocol knowledge
  - ✓ Need to update SW to keep current with security patches. But patching is risky if you do AND if you don't. Patches can cause unexpected issues in a multi-vendor, multi-technology environment.
- ✓ Some operators may attempt to create a "twin" network with in-house technology, but that usually results in a variety of technologies and hardware devices that need to be coordinated and managed, which can be highly complex.
- ✓ A simple form factor is needed that can simulate the live network and make testing easy and efficient.



# DIGITAL TWINS FOR TELECOM

*Digital Twins - dynamic representations of real-world assets, processes, systems & environments*

*They are becoming more and more commonplace across industries*

A Digital Twin can...

- ✓ Use relevant real-time data to adjust the call flow
- ✓ Continue to have it match the real-world network.
- ✓ Help companies improve their test tool efficiency
- ✓ Be easier than attempting to develop emulators internally.
- ✓ Help businesses realize faster time to value with new upgrades and equipment

*Intelligent emulators deliver level of representation, nearly indistinguishable from the live network. It can also use relevant real-time data to adjust the call flow and continue to match the real-world network.*

Digital Twin =  
Comprehensive  
simulated  
version of the  
live network

*In telecom, digital twins are full-state machines, often of a multi-node multi-protocol network environment, and can accommodate call flow variations as a real network would.*

*This contrasts with simulators, which typically represent a single network node and are static in their behavior.*

# REAL WORLD TESTING

Intelligent emulators deliver level of representation, nearly indistinguishable from the live network. It can also use relevant real-time data to adjust the call flow and continue to match the real-world network.

A simulator, which typically represents a single network node, digital twin emulators are full-state machines that can accommodate call flow variations as a real network would.

## *Emulates the whole network ...*

With Valid8, users can model their live network so that tests can run concurrently without negative impacts. For example, a 5G network digital twin could be used to test a certain vendor's network function upgrade or verify that security tools are working as expected. The simple form factor eliminates the need to manage multiple pieces of equipment or build in-house solutions, saving time and expense.

### Realistic

For telecommunications, having a highly realistic representation of the real-world telecom network elements, offers lower-risk opportunities to test and secure the network.

### Multi-Use

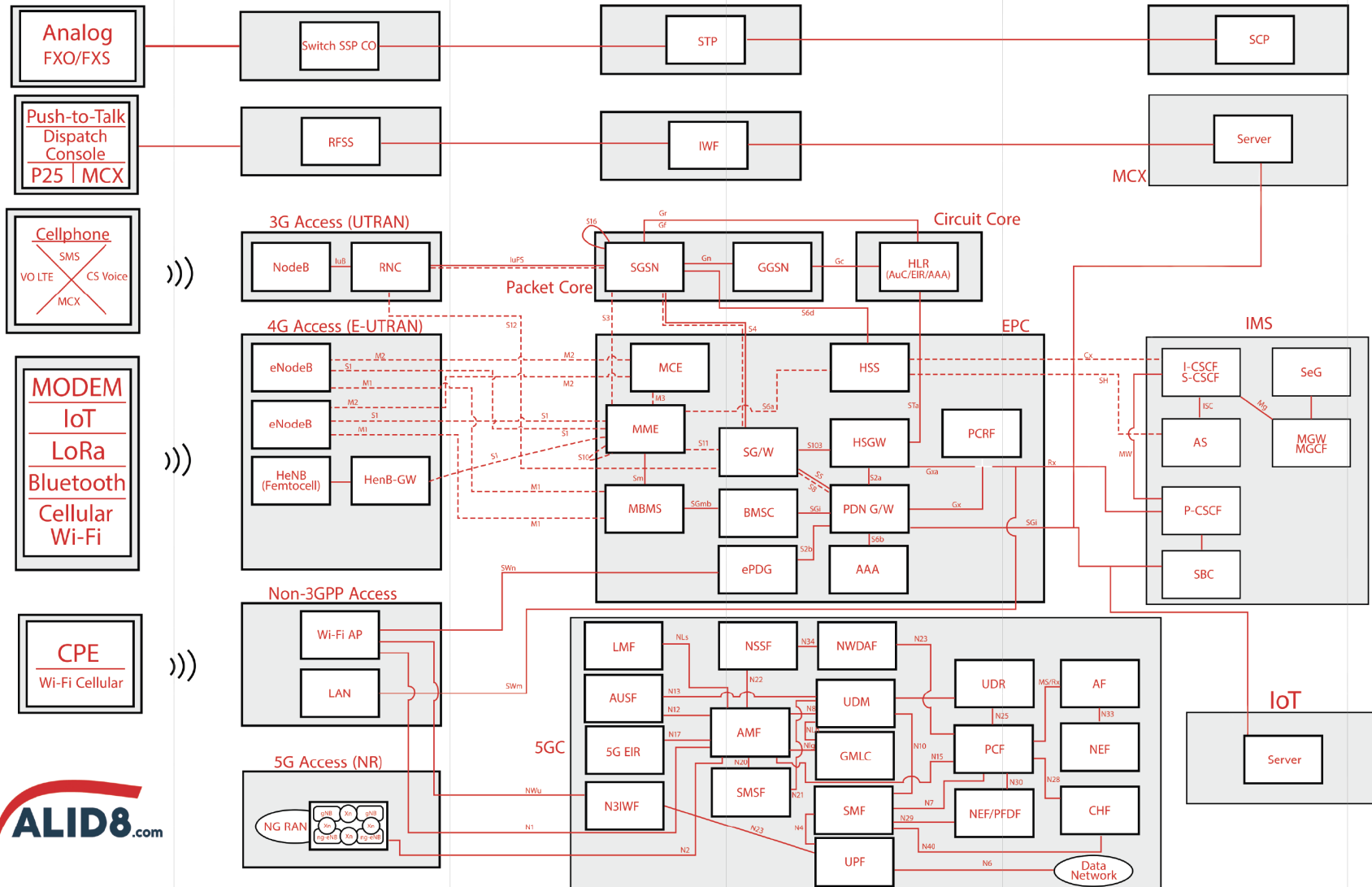
The digital twin can be used for simulation, integration, testing, monitoring, and maintenance.

### Testing Ease

The digital twin can be created before or after a network has been deployed physically, offering a variety of development points for testing.



# REAL WORLD TESTING - VALID8 DIGITAL TWIN EMULATORS (DUPLIC8)



Duplic8 enables multi-protocol, multi-technology, real-world emulation that matches a real network

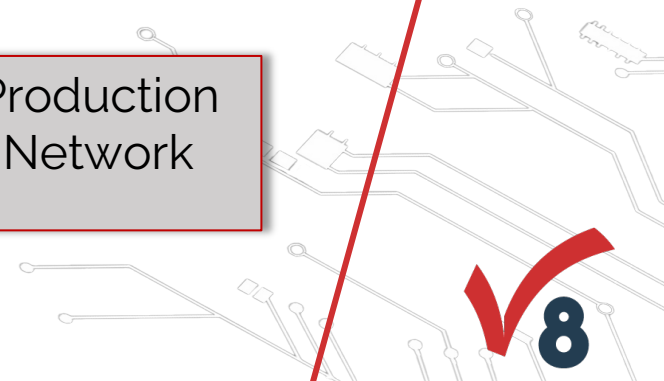
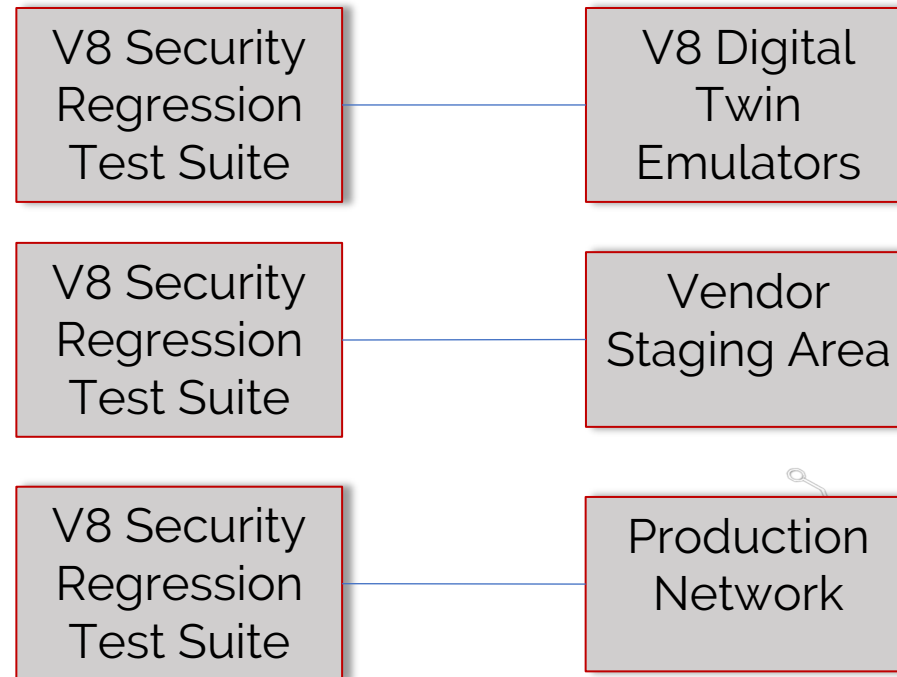
Run the entire network or just the parts you need to isolate and test a specific network function



# EXAMPLE WORKFLOW

## Workflow for testing vendor patches

- ✓ **EDUCATION PHASE** - Run Valid8's security test scenarios against Valid8's Digital Twin emulators to get familiar with the test flow, how to detect issues, using the digital twin
- ✓ **STAGING PHASE** - Install Vendor's patch on staging area and use Valid8's security scenarios to verify everything passes
- ✓ **PRODUCTION PHASE** - Install Vendor's patch on Production area and use Valid8's security scenarios to verify everything passes



# CONCLUSION

- Networks are ever more complex, creating more vulnerabilities and potential issues
- Valid8 Duplic8 Digital Twin emulators and 3-step workflow help reduce risk by providing a way to educate on the technologies with a high degree of realism, detect issues & verify updates before going into production.

DIGITAL  
TWIN

*Pitfalls of other testing models:*

*Tests Not Run Daily*

*Lack of Available Tools*

*Requires Lab Access*



# QUESTIONS?

Email [ian@valid8.com](mailto:ian@valid8.com)

Mobile +1 415 572 7919

LinkedIn [iancarpenter](#)

*Thank you!*



Additional Slides



# ✓ INCREASINGLY COMPLEX INFRASTRUCTURE

*With new technologies come a more complex infrastructure, leveraging hardware and software with regular upgrades. This complexity makes safely and efficiently managing and updating the network more difficult.*

***How do you verify security tools are working as expected?** Or how a new vendor's capabilities will function without negatively impacting the live network?*

## The Advent of 5G

Fifth Generation (5G) wireless is the most advanced mobile broadband technology to date. The emergence of 5G technology enables faster and higher capacity-based access to the internet in support of technologies such as the internet of things (IoT) or industrial internet of things (IIoT).

## 4G, 3G, Legacy Networks Not Going Away

While the rollout has been slower than expected, 5G promises to create a new, connected and smarter world for its users, but does not immediately eliminate 4G or 3G. For a time, these must all coexist.



*5G subscriptions are forecast to increase over the next 10 years to nearly **4 billion globally.***