A Full Stack Hybrid 5G Testbed for Security Testing

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Experimenting in 5G

- Promise of *ubiquitous*, *high-speed*, *low-latency* internet access
- Bulk of research in wireless communications oriented towards 5G
- With 5G being a new technology, security is still in its research infancy

No good way to test 5G attacks / defenses

- All reliable solutions either closed-source, prohibitively expensive or don't work out-of-the-box

Testbed Requirements

FIDELITY

- **Over-the-Air (OTA) transmissions** for real physical layer signals
- **Physical devices**:
  - *Software Defined Radio (SDR) – UE/gNB*
  - *Commercial Off-the-Shelf (COTS phones and 5G modems) – UE*
  - Used to maintain and **verify fidelity**

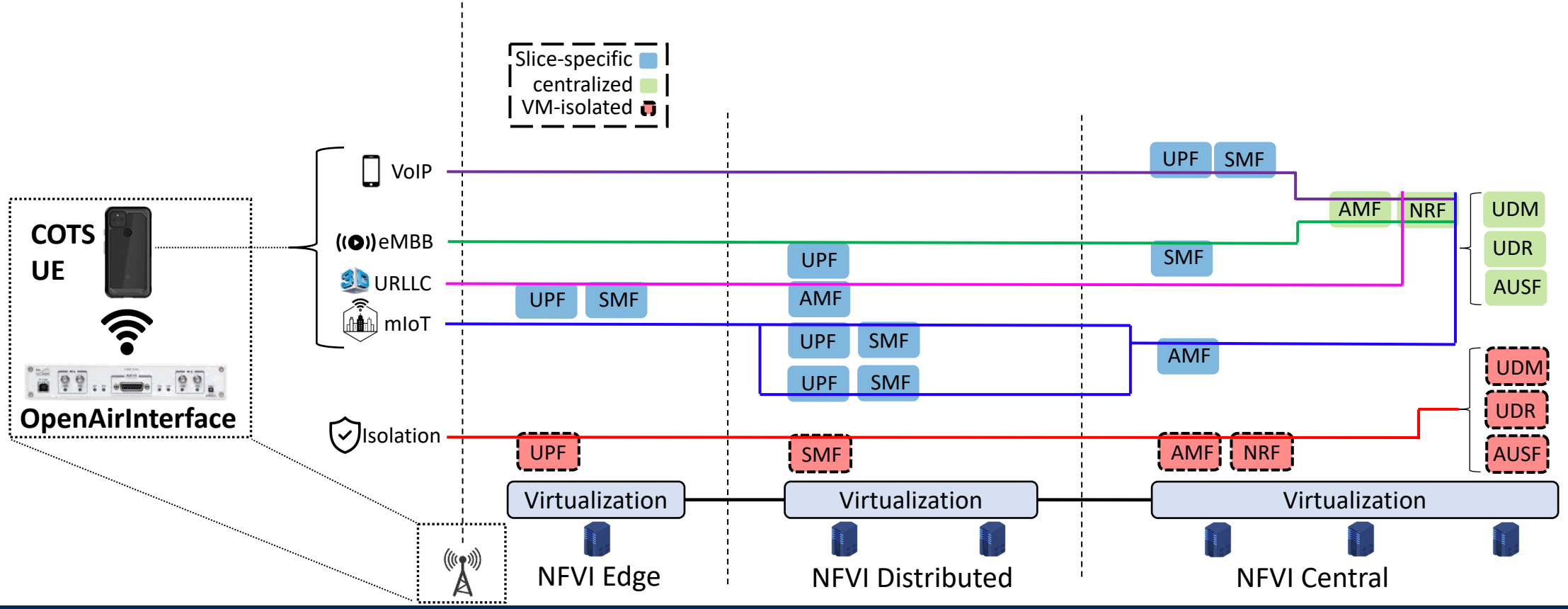
LARGE SCALE

- Emulated components – Docker
- Used for **large scale experimentation**

MATURITY

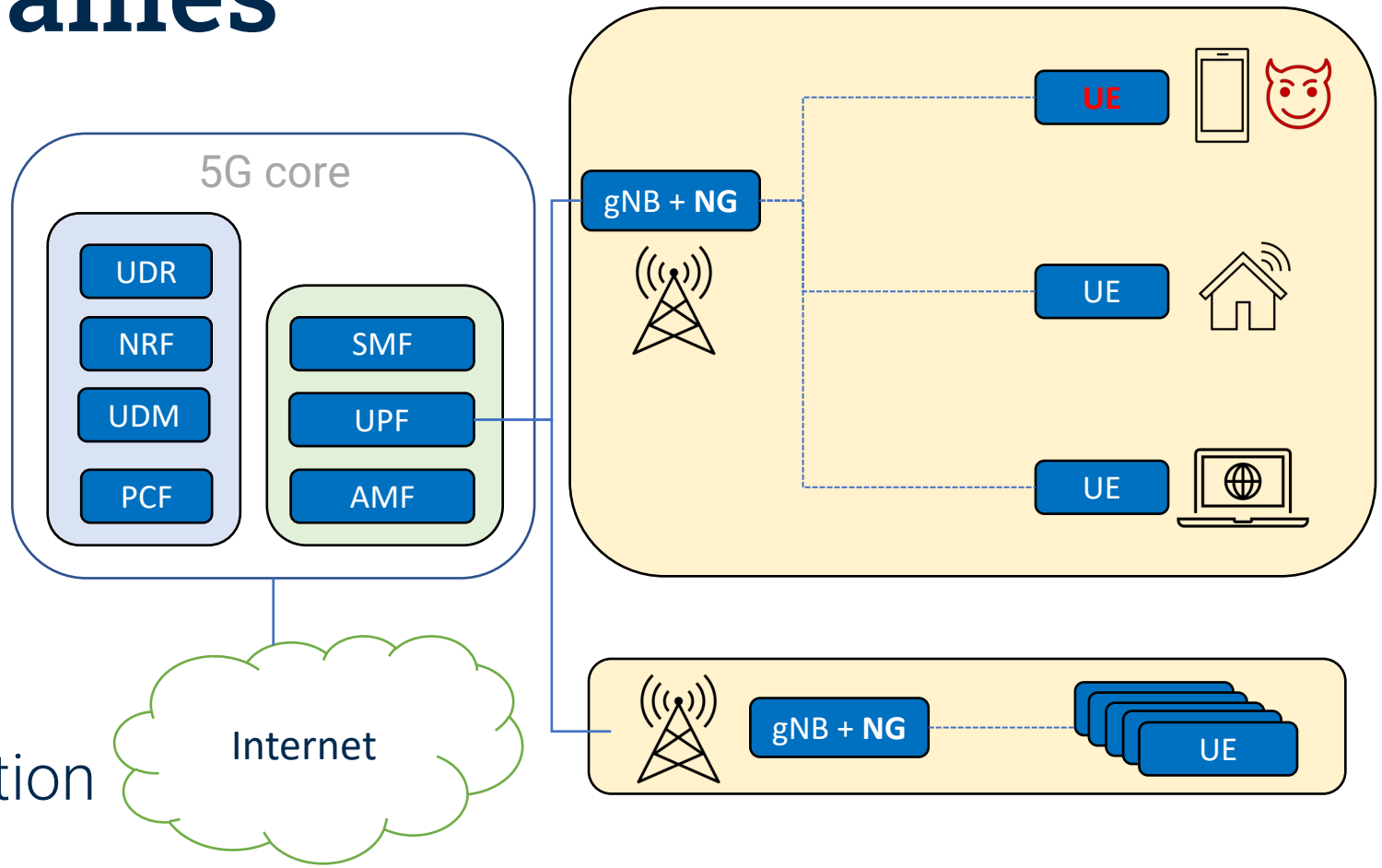
- **OAI –** full-featured 5G implementation in active development

5G Testbed Deployment



5G Network Games

1. Threat detection
2. Network isolation
3. Interrogation
4. Threat list expansion
5. Stepping stone detection



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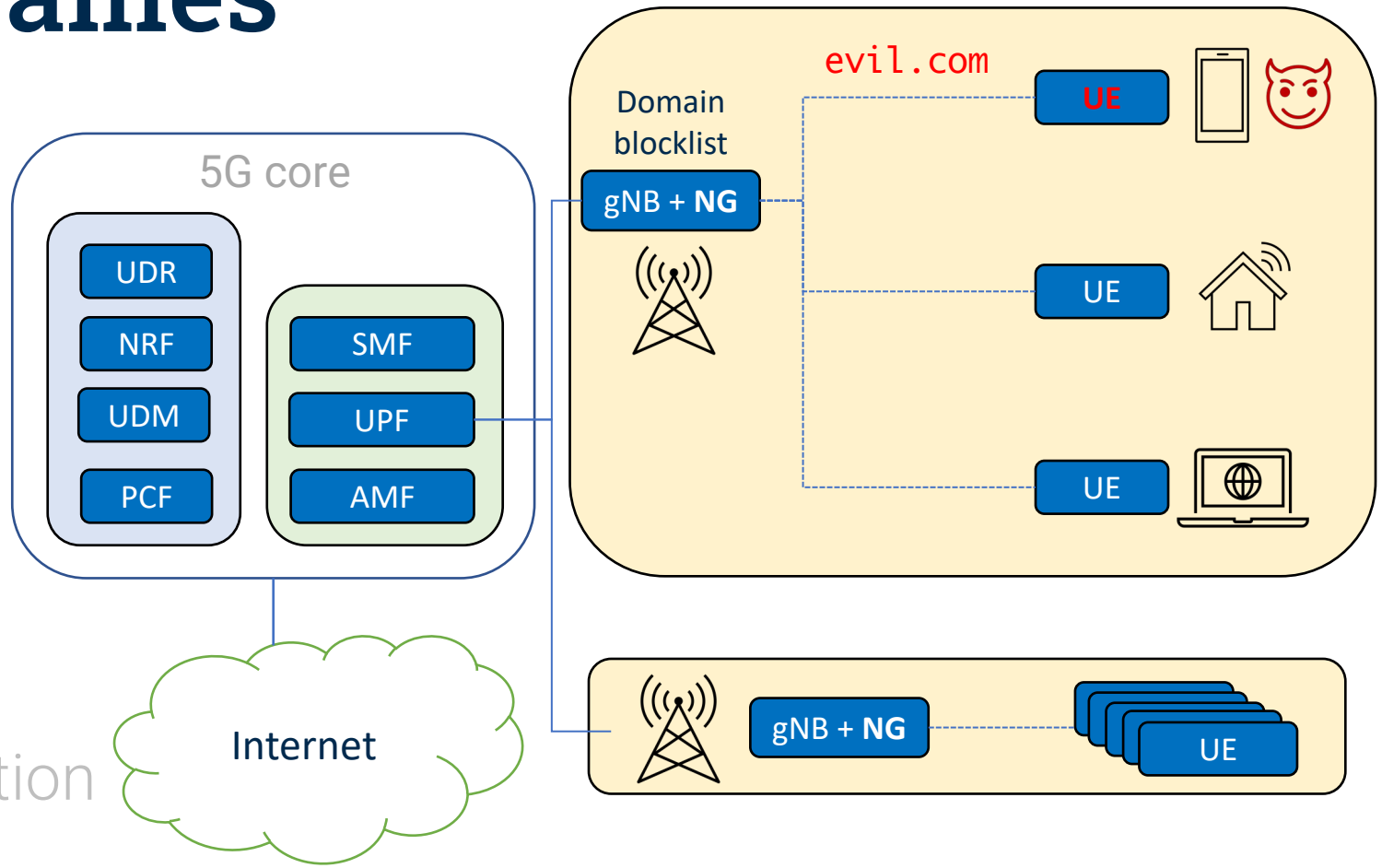

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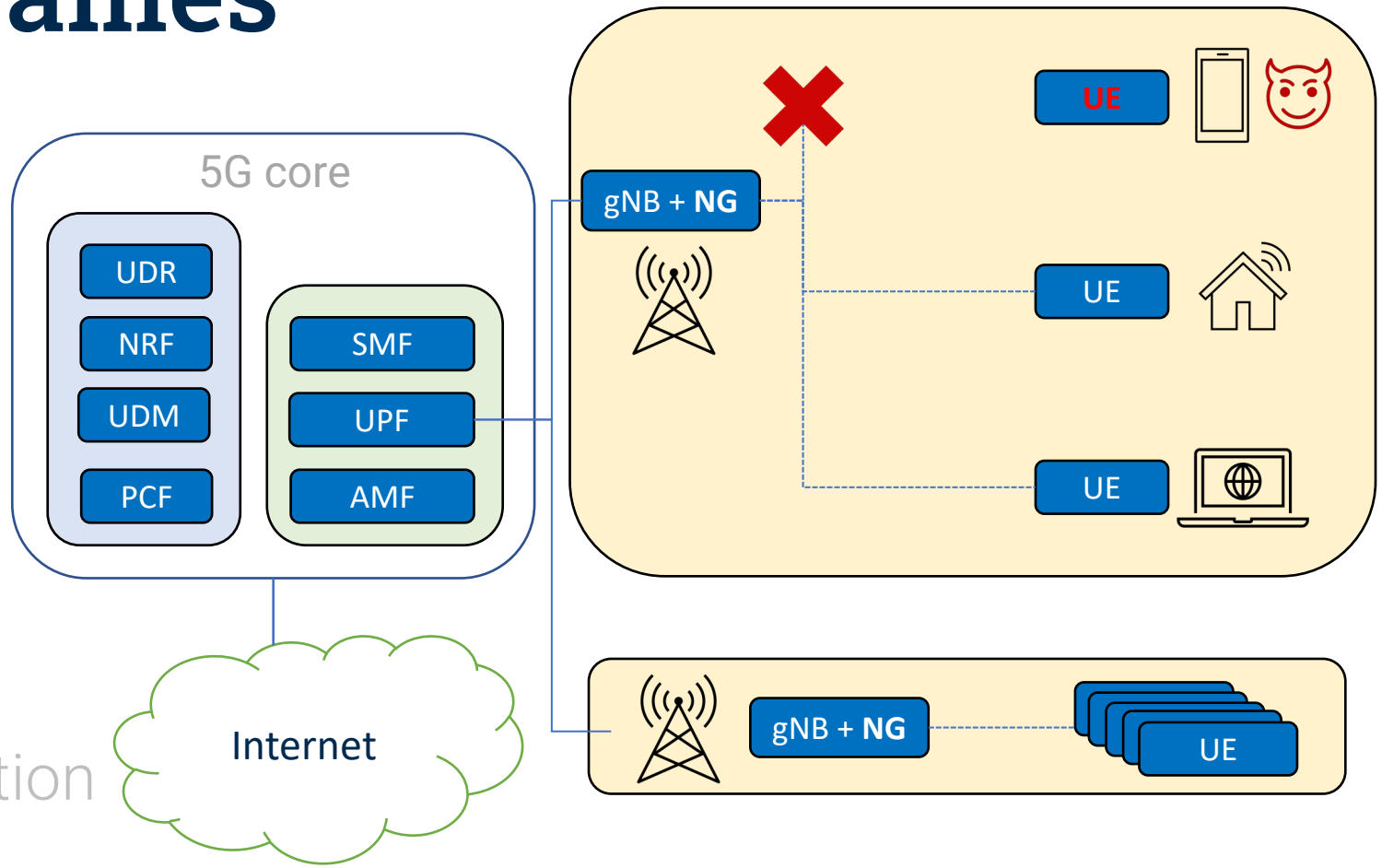

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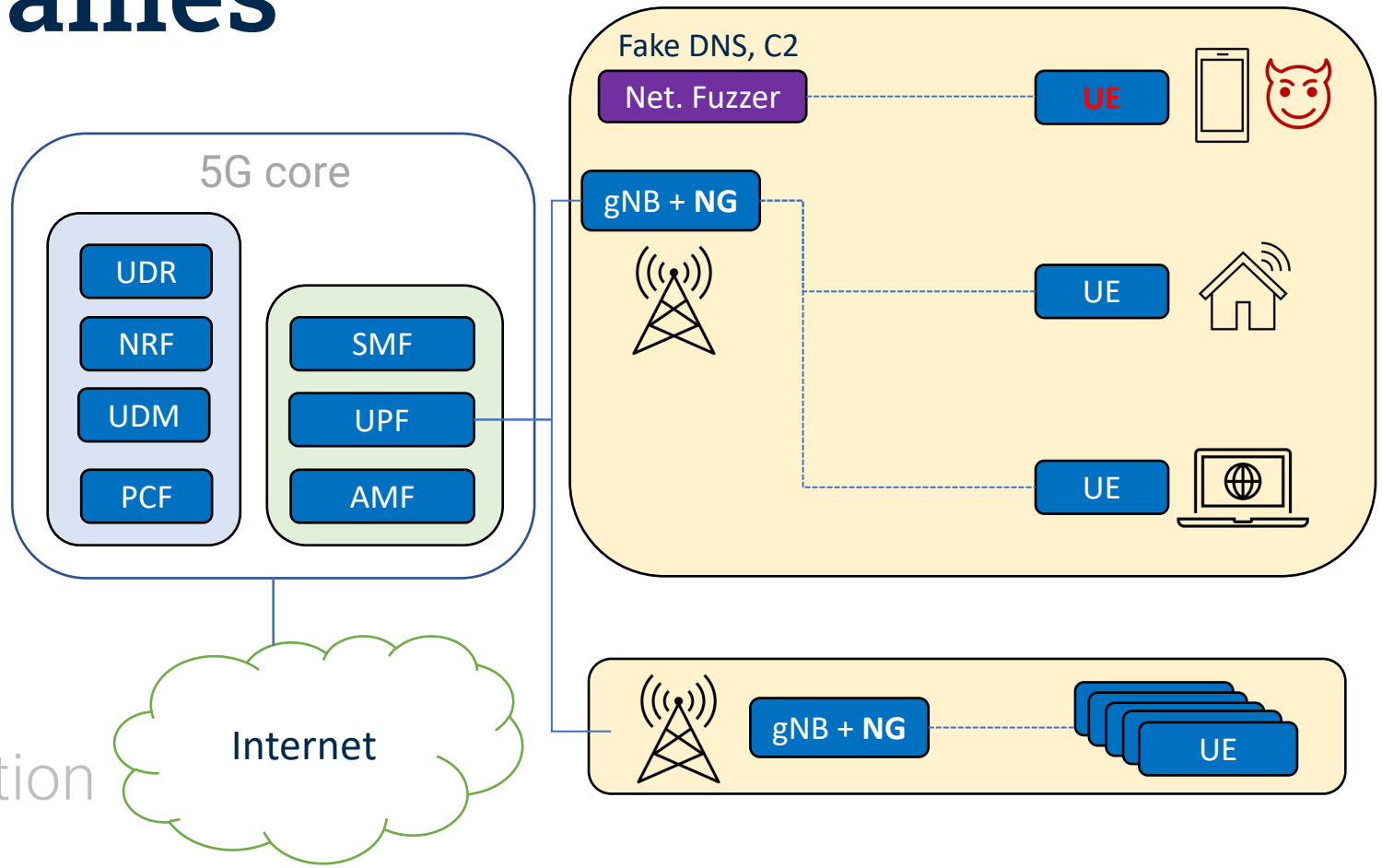

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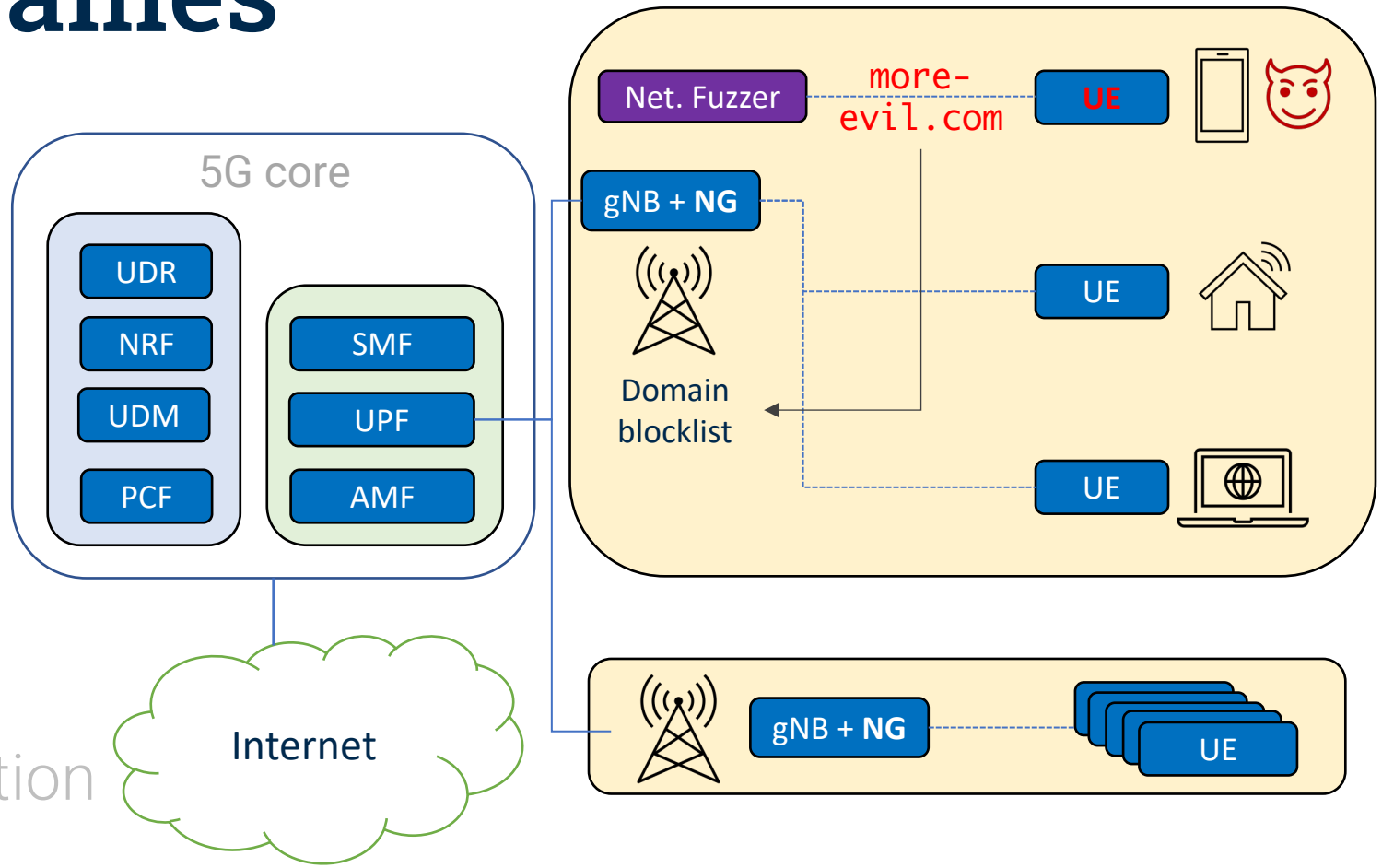

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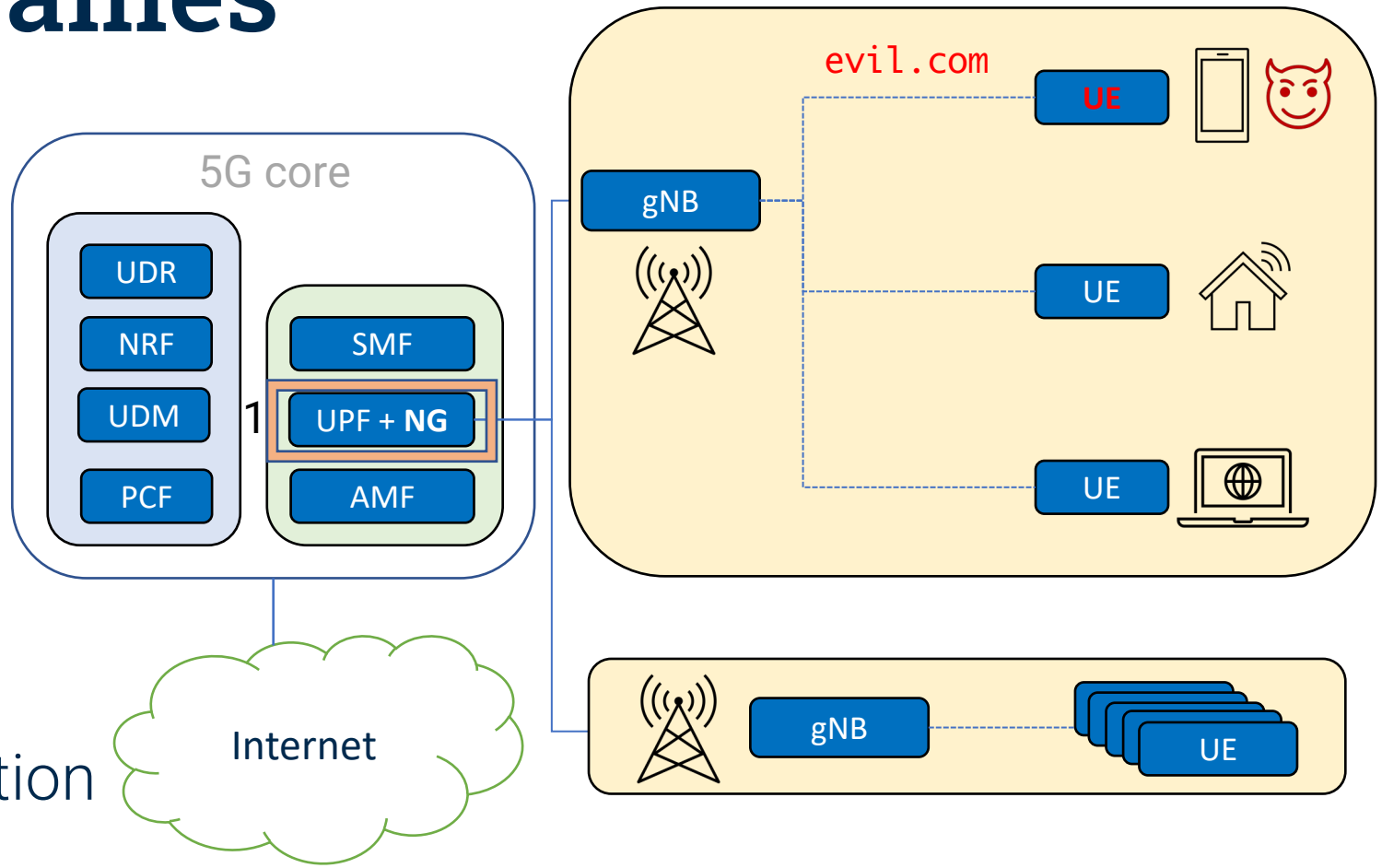

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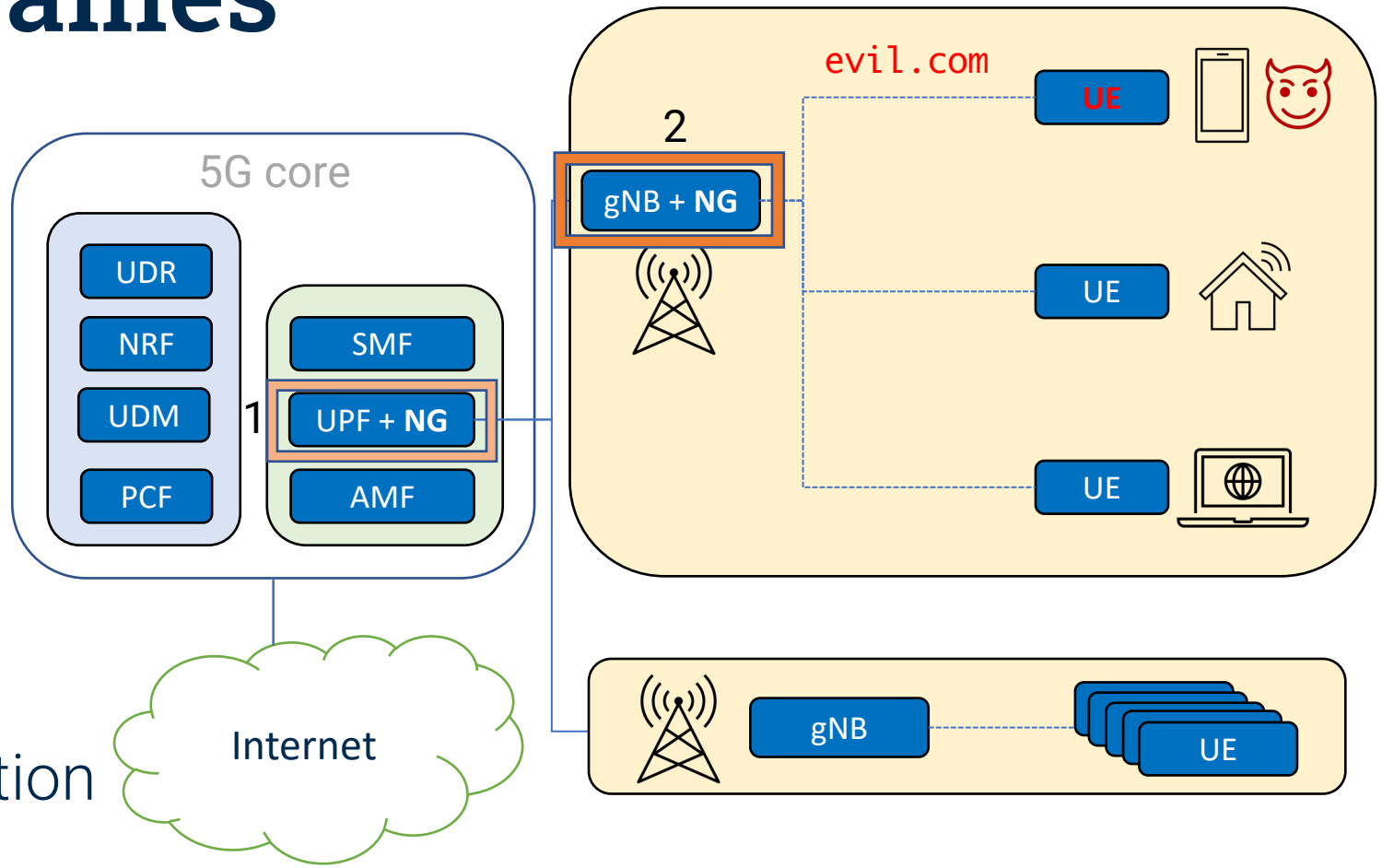

Looking Ahead

- Check it out! https://github.com/chateauxvt/oai5gtrafficgen
- Looking for collaborators and feedback
- Actively developing secure framework for composable, dynamic network defense primitives, e.g., firewall, DDoS defense, etc.
- Building more advanced defensive cyber operations that utilize5G-specific methods such as pushback, stepping-stone detection