Path Validation Application Scenarios

Side Meeting on Path Validation

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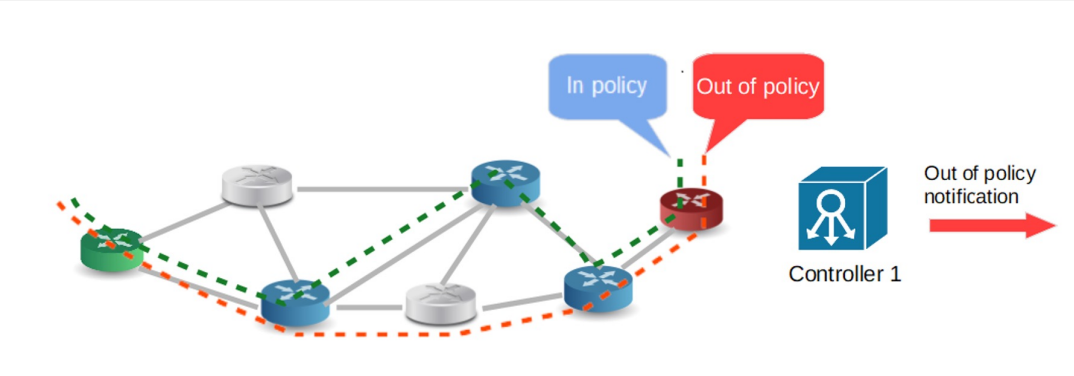
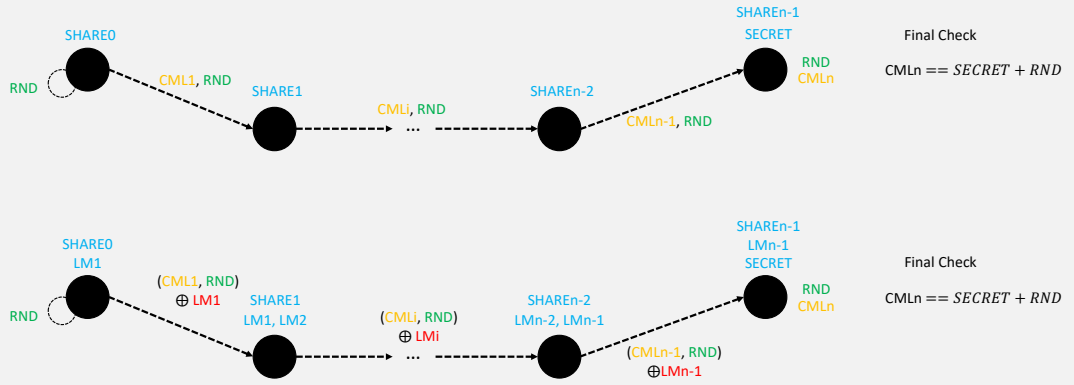
Verifiability as a Must

- The Software Network is here
  - Not any longer a future trend
  - NFV, SDN, disaggregation, Open-RAN, microservices…
- The cloud as a common model
  - Challenging all current trust and security assumptions
  - New models for deployment, collaboration, assurance, accounting…
- And the network invariants
  - Topology (and geometry!) awareness
  - The conservation principle
  - Openness
  - Integrity and auditability
  - Isolation

The Basic Use Case Topology Attestatiom

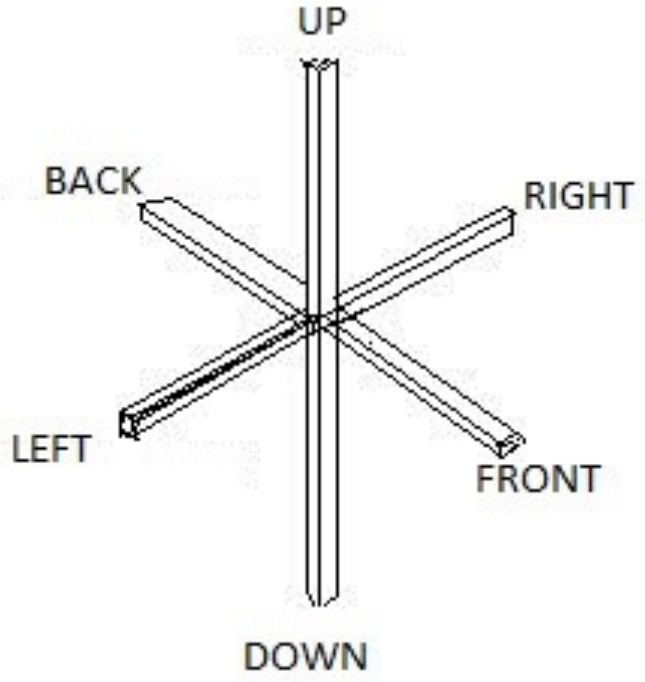
- Via Proof of Transit
  - Effective attestation at the data plane
- Prove traffic goes through specific elements
  - Packets and flows
  - According to a policy
  - Verifiable by third parties
- Add extra metadata to packets
  - Provide crypto to prove transit
  - Be careful with the obvious penalties





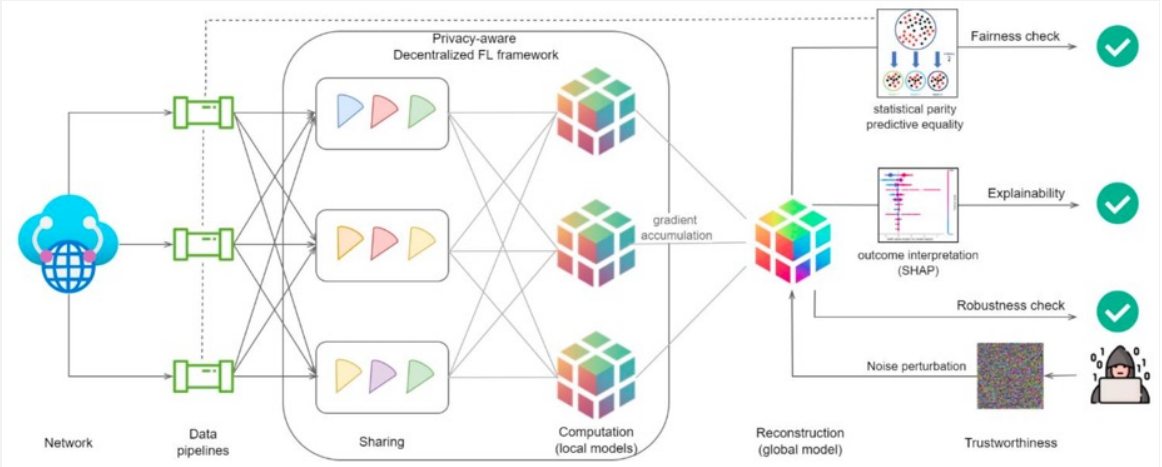
Application Scenarios
Security Policy Enforcement

- Customers select specific security functions
  - By orchestration (NFV, SDN…) or policy (a-la-I2NSF)
  - The service provider produces sequential evidence of applying these functions
- Customers require traffic to follow a specific secure overlay/underlay
  - Secured links
  - Trusted execution environments
  - Non-repudiability
  - Even in a per-packet basis, if required…



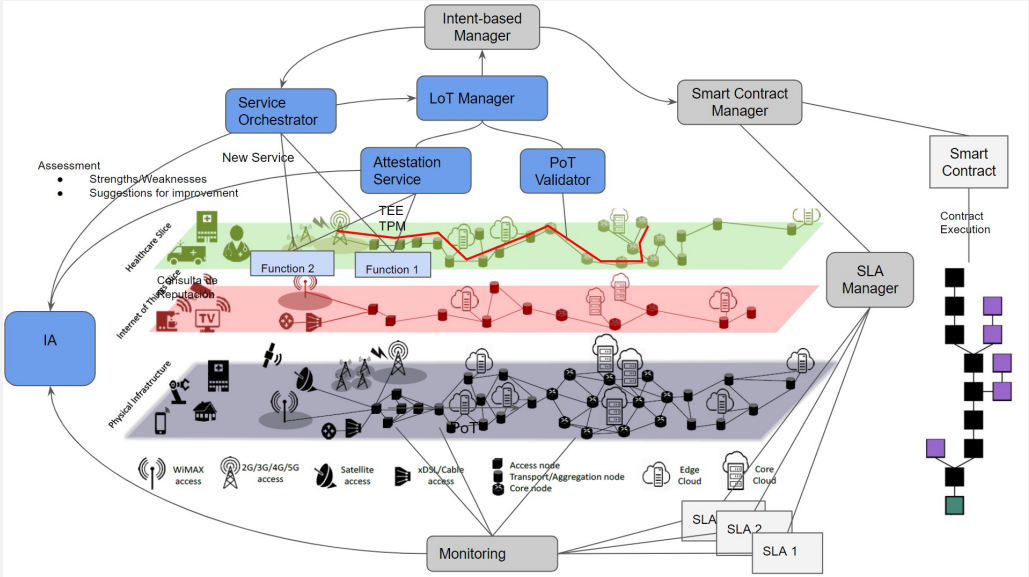
Application Scenarios Routing Compliance

- Geofencing
  - Verify customer data remains within defined geolocations, such as their campus or native country.
- Verify path properties
  - Specific implementations
  - Infrastructure providers
  - Not properly update devices
  - Privacy preserving functions
  - . . .
- Support trustworthy telemetry
  - As collected by reliable nodes
  - Requested measurements along the path



Application Scenarios Evaluating Level of Trust

- Level of Trust
  - Assess the trustworthiness of a network service in a particular application environment
  - Combine security and privacy aspects
- Integrate objective and subjective inputs
  - Crypto in use
  - Platform and software attestations
  - Supply chain
  - Reputation
  - Proof-of-transit
  - . . .
- Associated with service levels
  - Verifiable by third parties
  - Suitable for smart contracts
  - Support for intent



What We Are Interested in

- Current PoT is performed applying secret sharing schemas
  - Each element holds the share of a secret
  - Provided by a controller
  - Applied to metadata
  - Verified at the end of the network function chain being attested
- Willing to explore new mechanisms to achieve it
  - Reduce penalties
  - Extend applicability
  - Consider the combination with other Path Validation approaches