

DPI Customised

Day 1: DPI Fundamentals & TCP/IP Deep Dive

- **DPI architecture overview (inline vs passive)**
- **OSI model deep dive (focus on L3–L7)**
- **TCP/IP packet structure breakdown**
- **Flow vs packet analysis**
- **Real traffic walkthroughs**

Day 2: Advanced Packet Analysis & TLS Challenges

- **Advanced Wireshark techniques**
- **TLS handshake deep dive**
- **TLS 1.3 visibility limitations**
- **QUIC & SNI challenges**

Day 3: Hardware Selection & DPI Sizing

- **CPU, RAM, NIC selection strategy**
- **Gbps vs PPS sizing models**
- **NUMA architecture**
- **Scale-up vs scale-out design**

Day 4: Infrastructure & OS Hardening

- **BIOS tuning (C-states, HT, SR-IOV)**
- **Low-latency kernel (PREEMPT_RT)**
- **CPU isolation, hugepages**
- **OS hardening (UFW, auditd, SSH)**

Day 5: Inline DPI Architecture & Deployment

- **L2 transparent vs L3 inline**
- **Fail-open vs fail-close design**
- **Active/Active vs Active/Standby HA**
- **Asymmetric routing issues**

Day 6: DPDK & Kernel Bypass

- DPDK architecture (EAL, PMD, mempool)
- NIC binding (vfio-pci)
- Zero-copy packet processing

Day 7: XDP & Flow Processing

- XDP fundamentals
- LPM trie usage
- Lock-free flow tables (rte_hash)

Day 8: DPI Engine – Protocol Decoders

- L3/L4/L7 decoding pipeline
- HTTP, DNS, QUIC decoding basics
- Flow reassembly concepts

Day 9: Signature-Based Detection (Hyperscan)

- Intel Hyperscan architecture
- Multi-pattern matching
- YAML signature design

Day 10: Behavioral ML & TLS Fingerprinting

- Flow feature engineering
- XGBoost classification
- JA4 fingerprinting

Day 11: Policy Engine & Enforcement

- Policy schema (match → action)
- Token bucket rate limiting
- XDP enforcement path

Day 12: Subscriber Awareness & AAA

- Subscriber mapping (IP → user)
- RADIUS/DHCP integration
- CGNAT challenges

Day 13: Observability & Monitoring Stack

- **KPI metrics (latency, PPS, drops)**
- **Prometheus + Grafana dashboards**
- **Alertmanager rules**

Day 14: Kafka, Storage & Data Retention

- **Kafka producer tuning**
- **ClickHouse schema design**
- **Flow vs packet storage**
- **Retention strategies**

Day 15: Performance Engineering, HA & Go-Live

- **Mpps vs Gbps tuning**
- **Microburst handling**
- **Load testing strategies**
- **HA failover validation**
- **Runbooks & production readiness**