Cross-Layer Framework for the *ns*-2 Simulator


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**Cross-Layer Optimisations**

- Traditional strict layer boundaries
  - good architectural abstraction
  - e.g. anything over IP over anything
  - but strict layers result in poor performance
  - too much information hiding
  - implicit assumptions \(\Rightarrow\) improper response

- Cross-layer optimisations
  - **translucent** layer boundaries
  - cross-layer control loops
  - *dials* expose characteristics below
  - *knobs* influence behaviour
  - composable protocol functionality

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**Approach and Design**

- **Goal:**
  - *ns*-2 modifications to support cross-layering
  - integration with existing protocol models

- **Approach**
  - add cross-layer management plane
    - defines inter-layer control and signalling
    - new data structures at each node
    - triggers adaptation mechanisms
  - adaptation modules
    - use dials to tune protocol behaviour at each layer
  - **in-band**: shared dials in protocol headers
  - **out-of-band**: new signalling messages

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**Implementation**

- **Cross-layer manager functionality**
  - update *knob* and *dial* matrices
  - responsible for interlayer signalling