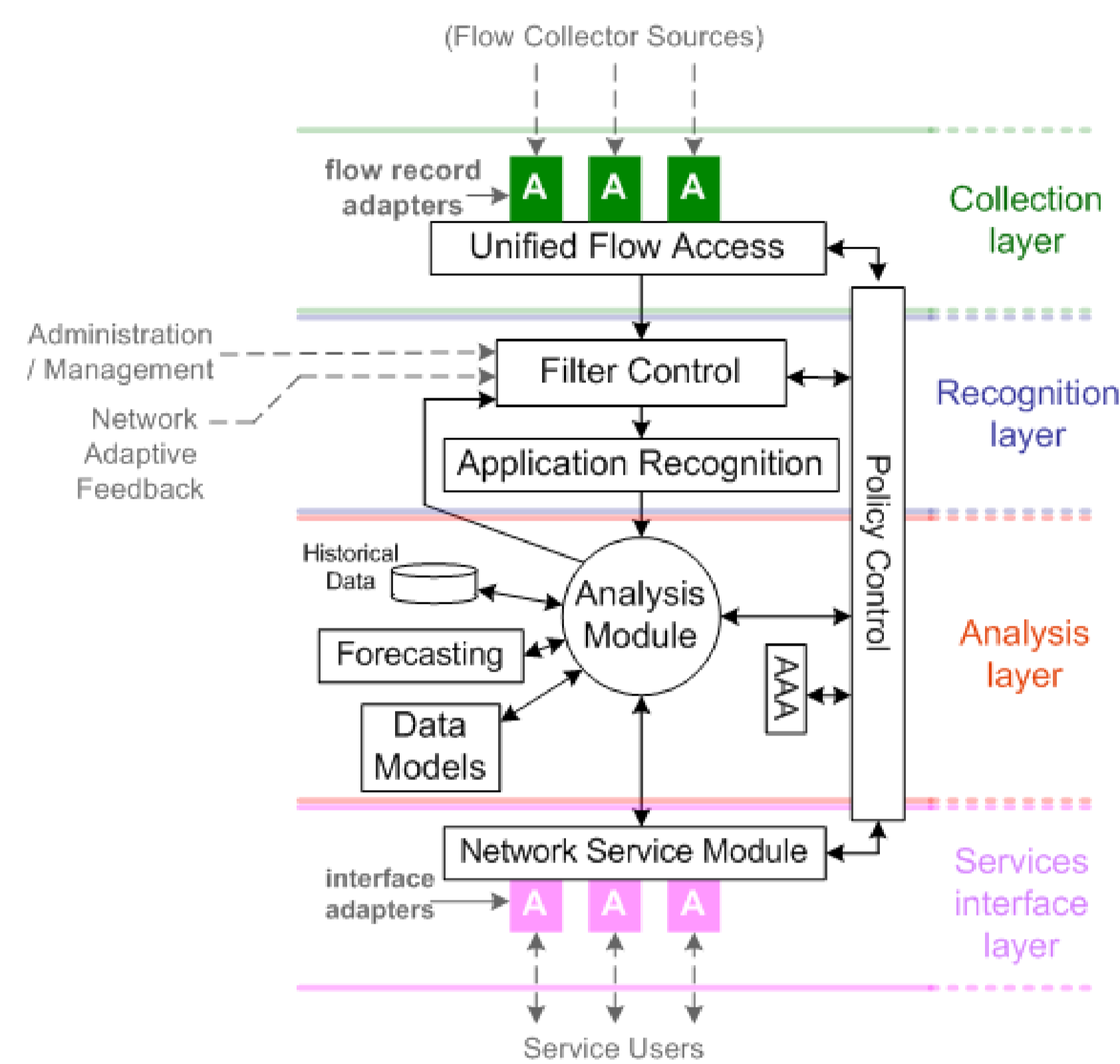


Real Time Flow Analysis For Network Services

Andrey Bobyshev, Phil Demar, Wenji Wu FNAL, Batavia, IL 60510, USA

Abstract: Emerging dynamic circuit services are being developed and deployed to facilitate high impact data movement within the research and education communities. These services normally require network awareness in the applications, in order to establish an end-to-end path on-demand programmatically. This approach has significant difficulties because user applications need to be modified to support API of these services. Considering the highly distributed and complex applications in use for data movement within High-Energy Physics community, this can be a challenging task.

We present a different approach to establishing and tearing down dynamic circuits. Instead of forcing network awareness in applications, we are working on developing application awareness in the network. Our application awareness within the network is based on collection and analysis of network flow data in near real time. The objective of this project is to develop heuristic algorithms that recognize flow patterns with the specific characteristics for specific applications of interest. Once such flows are recognized, our service can initiate steps to modify offered network services, such as establishing a dynamic circuit to carry the application's traffic.



Collection layer

An unified access to the existing flow-based data on a timely manner

Filter and Traffic recognition layer

The recognition layer selects flows of interest through filtering techniques and tags them as belonging to selected applications or classes of traffic. Specified traffic pattern will be searched in real-time based on multiple pre-defined data models.

Analysis layer

Applications and selected classes of traffic detected by the Recognition Module will be analyzed by statistical and heuristics methods to estimate performance characteristics and predict the future resource needs or generate other alerts as required.

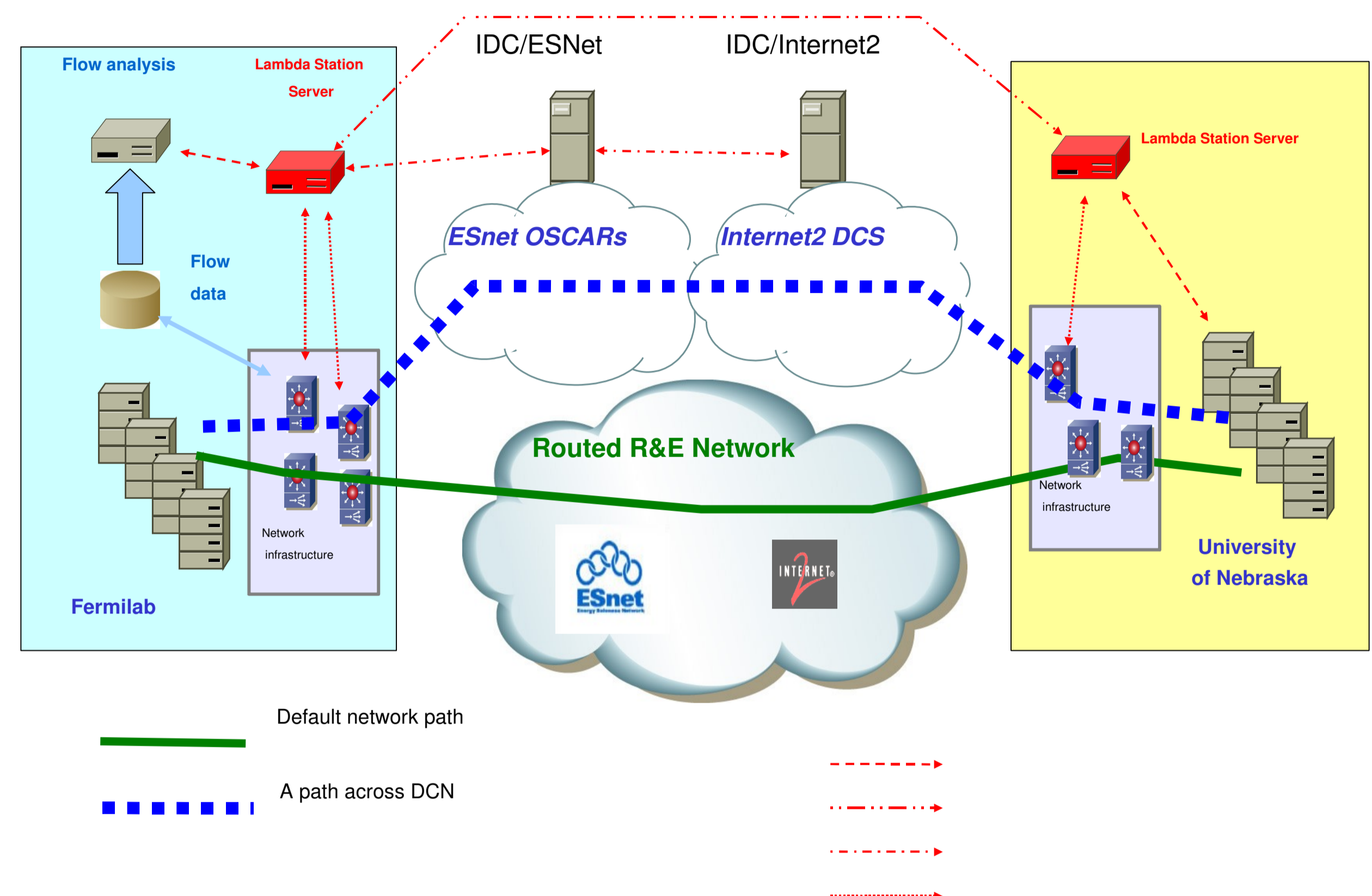
Network Service layer

The Network Service layer is an interface to other services that will benefit from knowledge of network status. Initial interfaces are being developed:

- 1). Reserving dynamic circuit on predicted bulk data movement
- 2). Blocking malicious flow pattern or trigger a site IDS
- 3). Detecting path inconsistency with potential performance impact

Goals of the project:

- Problem space: last mile connectivity between local computing facilities and alternate WAN paths
- Solution: selective forwarding on per flow basis
- On-demand from applications
- Policy Based Routing, w/ DSCP marking support
- Emergence of dynamic circuit DCN/OSCARs with Lambda Station as an initiator of DCN circuits
- Flow-based analysis to determine conditions to establish a dynamic circuit



Prototyped the *ftwatch* tool invokes dynamic circuit between USCMS-Tier1 Facility at Fermilab and CMS Tier2 Center at the University of Nebraska-Lincoln across ESNet and Internet2 : 50TB Data moved in 32 hours

