



## BRINGING SDN TO THE INTER-DOMAIN SETTINGS

The focus of the project is to enable added-value services to be provided thanks to SDN, on top of Internet Exchange Points and other network interconnection fabrics.

The services would relate not only to the flexibility of the interconnection fabric, but most importantly to enable the content and data center ecosystem that is present at the interconnection fabric to collaborate. The ultimate goal is to create a service marketplace on top of the ecosystem composed of Cloud/data centers, networked applications, and the interconnection fabric.



## CONSORTIUM



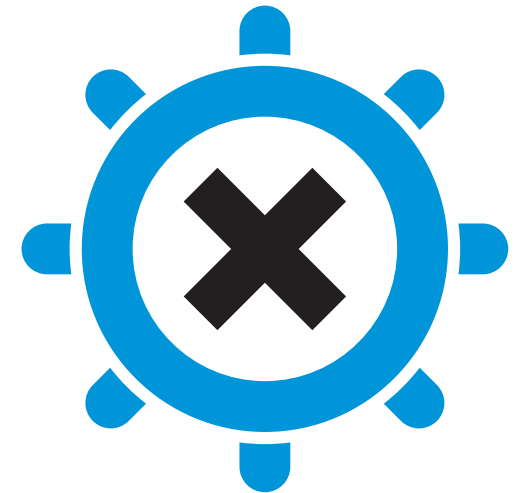
<https://www.h2020-endeavour.eu/>



[https://twitter.com/h2020\\_endeavour](https://twitter.com/h2020_endeavour)



<https://www.h2020-endeavour.eu/rss.xml>



## ENDEAVOUR

TOWARDS A FLEXIBLE  
SOFTWARE-DEFINED  
NETWORK ECOSYSTEM



## CONTEXT & PROBLEM

### THE RISE OF THE IXP

Internet eXchange Points (IXPs) originate at the time the Internet transitioned from an academic/research network into today's commercial infrastructure.

Over the past 20 years, as the Internet grew by any imaginable metric, NAPs (Network Access point) were replaced by modern IXPs. The critical role they have played in the Internet ecosystem has until recently gone largely unnoticed by the Internet community at large.

### CLOUD & DATACENTERS IN THE INTERNET

To cope with the increasing demand for content, content delivery infrastructures (including Content Delivery Networks (CDNs), datacenters, and Cloud providers) deploy massively distributed server infrastructures. IXPs already play a key role in inter-connecting the infrastructures that host content and applications with the ecosystem that consumes this content or relies on these applications.

IXPs will become even more critical when tighter delay constraints are necessary and more support from the network is required by applications running in the Cloud.

### SOFTWARE-DEFINED NETWORKING (SDN)

Software-defined networking has attracted a lot of attention in the networking community over the last few years. With attention also comes myths and misunderstanding, which we will attempt to clarify below by defining the main characteristics of SDN.



## OBJECTIVES & EXPECTED RESULTS

The objective of **ENDEAVOUR** is to address current limitations of the Internet interconnection model, as well as to open the possibility for novel services, creating the possibility for new economic models around the created ecosystems

### INTERDOMAIN SDN CONTROL PLANE

**ENDEAVOUR** will research, develop, and evaluate an SDN architecture for the network ecosystem of a large IXP and its members. It includes:

- × Distributed SDN Control Plane
- × SDN Programming Abstractions

### SCALABLE FINE-GRAINED MONITORING

**ENDEAVOUR** will develop a Monitoring Platform for the SDN-enabled IXP. To enable new networking services and technology, monitoring tools need to be flexible in what/how much information is collected, while being able to operate at the high-speed data rates and massive data volumes happening at current and future IXPs. This objective can be broken down into the following specific objectives:

- × High Speed Data Plane Monitoring System
- × Open and Extensible Monitoring Toolbox

### FLEXIBLE IXP MANAGEMENT FOR OPERATORS

The operation of an IXP is complex, given the volume of data involved, and the number and diversity of members that peer through its infrastructure. Currently, IXPs lack the awareness and manageability to make their operations more efficient and resilient.

We will develop specific use cases that demonstrate how the **ENDEAVOUR** SDN and monitoring tools can greatly facilitate the internal management of IXPs.

- × IXP Protection against Member's Equipment Misconfiguration
- × Internal Traffic Visibility

### NETWORK SERVICES OFFERED TO IXP ECOYSTEM

**ENDEAVOUR** will implement a set of use cases that showcase the types of novel interdomain network services that can be offered to the IXP ecosystem. We will explore multi-homing, application-level traffic engineering, and flow anomaly detection.