

Commodities ▯ Routers Projects ▯

[CHANGE](#)

[CHANGE](#)

"The CHANGE project addresses a central problem of today's Internet: its size and scope make innovation through the introduction of new core network technologies very difficult. The Internet suffers from "ossification". Even minor changes only happen through the accretion of point solutions that embed knowledge in the network, optimizing today's applications at the expense of tomorrow's.

The goal of CHANGE is to reinvigorate innovation on the Internet, in order to better support current services and applications and enable those of tomorrow. This will be achieved by introducing a common concept of a flow-processing platform, instantiated at critical points in the network. Although the platform and its interfaces are common, the processing performed must be programmable, allowing the network to evolve and support the needs of rapidly changing applications. Such platforms can be built from commodity hardware – e.g. x86 servers and commodity switching chipsets –, and are both scalable and powerful while retaining the flexibility to quickly introduce processing primitives."

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OpenFlow based Projects

[OpenFlow](#)

[OFELIA: OpenFlow in Europe – Linking Infrastructure and Applications](#)

OpenFlow

"The OpenFlow Switching Specification is currently maintained by a group of university researchers and network administrators. Membership is free, and our meetings are open to anyone. Our goal is to promote research and innovation in networking, particularly in the networks we use everyday in our universities. Our group proposes that the Ethernet switches and routers we deploy in our universities – in wiring closets, basements and computer centers – should support the OpenFlow feature. OpenFlow allows a researcher to experiment with new functionality in their own network; for example, to add a new routing protocol, a new management technique, a novel packet processing algorithm, or even – eventually – alternatives to IP."

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OFELIA : OpenFlow in Europe – Linking Infrastructure and Applications

"The aim of the OFELIA project is to create a unique experimental facility that allows researchers to not only experiment on a test network but to control the network itself precisely and dynamically. To achieve this, the OFELIA facility is based on OpenFlow, a currently emerging networking technology that allows to virtualize and control the network environment through secure and standardized interfaces."

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New Generation Internet Projects

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[Internet2](#)

"Internet2 is the foremost U.S. advanced networking consortium. Led by the research and education community since 1996, Internet2 promotes the missions of its members by providing both leading-edge network capabilities and unique partnership opportunities that together facilitate the development, deployment and use of revolutionary Internet technologies. By bringing research and academia together with technology leaders from industry, government and the international community, Internet2 promotes collaboration and

innovation that has a fundamental impact on the future of the Internet."

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[Clean Slate](#) - Stanford University

"Our mission is to "reinvent the internet" so Future Internet can: overcome fundamental architectural limitations (e.g. lack of security and mobility support) of today's Internet; incorporate new technologies (e.g. sensor networks, optical networks); enable new class of applications and services (e.g. content dissemination, sensorized physical world, large scale virtual world environments); continue to be a platform for innovations and thus be an engine for economic growth and prosperity for the society."

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GENI - NSF

"The Global Environment for Network Innovations (GENI) is an experimental suite of infrastructure designed to support Network Science and Engineering experiments ranging from new research in network and distributed system design to the theoretical underpinnings of network science, network policy and economics, societal values, and the dynamic interactions of the physical and social spheres with communications networks. Such research holds great promise for new knowledge about the structure, behavior, and dynamics of our most complex systems -- networks of networks -- with potentially huge social and economic impact. Researchers will be able to build their own new versions of the "net" or to study the "net" in ways that are not possible today. Compatibility with the Internet is NOT required. The purpose of GENI is to give researchers the opportunity to experiment unfettered by assumptions or requirements and to support those experiments at a large scale with real user populations."

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[OneLab](#)

“OneLab provides an open, general-purpose, shared experimental facility, both large-scale and sustainable, which allows European industry and academia to innovate today and assess the performance of their solutions.”

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[NITOS](#) (Network Implementation Testbed using Open Source code)

“NITOS is a wireless experimental testbed that is designed to achieve reproducibility of experimentation, while also supporting evaluation of protocols and applications in real-world settings. NITOS consists of nodes based on commercial Wi-Fi cards and Linux-based open-source platforms, which are deployed both inside

and outside of the University of Thessaly's campus building.”

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FEDERICA (Federated E-infrastructure Dedicated to European Researchers Innovating in Computing network Architectures)

“The FEDERICA project supports research experiments on new Internet architectures and protocols.”

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Panlab (Pan European Laboratory

Infrastructure Implementation)

“PII addresses the need for large-scale testing facilities in the communications area by implementing an infrastructure for federating testbeds. The PII project uses the concept of European innovation clusters and builds on the existing testbeds that are supporting scientific and technological endeavour within these clusters. The central objective of PII is to create a testbed federation among these regional innovation clusters in Europe.”

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[FIND \(Future Internet Design\)](#) - NSF NeTS research program

"FIND (Future Internet Design) is a major new long-term initiative of the NSF NeTS research program. FIND invites the research community to consider what the requirements should be for a global network of 15 years from now, and how we could build such a network if we

are not constrained by the current Internet -- if we could design it from scratch. FIND solicits research across the broad area of network architecture, principles, and mechanism design, aimed at answering these questions. The philosophy of the program is to help conceive the future by momentarily letting go of the present - freeing our collective minds from the constraints of the current state of networking."

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[Network Virtualization](#) - Princeton - Jennifer Rexford's Website

"Network virtualization provides a powerful way to run multiple networks, each customized to a specific purpose, at the same time over a shared substrate. Our research on network virtualization focuses on two main scenarios. First, we consider the role of virtualization in running

multiple experiments simultaneously in a shared experimental facility. For example, the NSF GENI initiative focuses on the design and deployment of a shared, wide-area experimental facility to support a wide range of research in networking and distributed systems. The VINI project (radio interview) is a step in that direction, supporting experimentation with new routing, forwarding, and addressing schemes on a shared facility built on top on general-purpose processors. Second, we consider the role of virtualization to support multiple architectures simultaneously as a long-term solution for the future Internet. The Cabo project explores the benefits of running customized architectures, as well as how a virtualized system enables an economic refactoring of a future Internet into infrastructure providers (that own and operate the equipment) and service providers (who lease virtual components and offer end-to-end services to users). All three projects grapple with the technical challenges of providing a virtualized, programmable substrate that operates at high speed; the Cabo project must address the additional challenges of building a substrate that can operate without any dependency on the existing Internet."

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VINI - Planet Lab

"VINI is a virtual network infrastructure that allows network researchers to evaluate their protocols and services in a realistic environment that also provides a high degree of control over network conditions. VINI allows researchers to deploy and evaluate their ideas with real routing software, traffic loads, and network events. To provide researchers flexibility in designing their experiments, VINI supports simultaneous experiments with arbitrary network topologies on a shared physical infrastructure. VINI currently consists of 37 nodes at 22 sites connected to the National LambdaRail, Internet2, and CESNET (Czech Republic)."

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[NewArch Project](#): Future-Generation
Internet Architecture

"Under DARPA funding, USC/ISI, MIT LCS, and ICSI collaborated on a DARPA-funded research project to reconsider the Internet architecture in the light of present realities and future requirements."

Arquivo: [Final Technical Report](#)

Apresentação: [.ppt](#)

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TRIAD: A New Next-Generation Internet Architecture

"Today, the primary use of the Internet is content distribution | delivery of web pages, audio and video streams to client browsers. However, scaling to meet the enormous demands of the web have required ad hoc and, in some cases, proprietary protocols and

mechanisms to be deployed. Unfortunately, these ad hoc mechanisms have scaling problems and conflict with the original Internet architecture. IPv6, the current leading candidate for a next generation Internet architecture, provides more addresses but does not help with the content problem, given that its design predates the web. In this paper, we present TRIAD as a new next generation architecture. A key aspect of TRIAD is the explicit inclusion of a content layer that provides scalable content routing, caching and content transformation. TRIAD also provides extensible path-based addressing using a simple shim " protocol on top of IPv4. We claim that TRIAD not only provides scalable content distribution, but also solves the Internet problems with supporting network address translation (NAT) and provides innovative solutions to mobility, virtual private networks, policy-based routing and source spoofing. Its compatibility with IPv4, TCP, DNS and other dominant Internet protocols facilitates incremental deployable." [tria d.ps.gz](http://tria.d.ps.gz)

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[The FP7 4WARD Project](#)

"The need for structural changes in the Internet is becoming increasingly evident. 4WARD is combining a set of radical architectural approaches building on a strong mobile and wireless background to design inter-operable and complementary families of network architectures. 4WARD is a project in the European 7th Framework Program Call 1 and partly funded by EU It belongs to Objective ICT-2007-1.1 "Network of the Future" and started January 2008, with a first phase of 2 Years. The total size is 23.2 million euro corresponding to approximately 180 person-years. Today's network architectures are stifling innovation, restricting it mostly to the application level, while the need for structural change is increasingly evident. The absence of adequate facilities to design, optimize and interoperate new networks currently forces a convergence to an architecture that is suboptimal for many applications, and that cannot support innovations within itself, the Internet. We have reached a critical point in the impressive development cycle of the Internet that now requires a major change. 4WARD overcomes this impasse through a set of radical architectural approaches built on our strong mobile and wireless background. We improve our ability to design

inter-operable and complementary families of network architectures. We enable the co-existence of multiple networks on common platforms through carrier-grade virtualization of networking resources. We enhance the utility of networks by making them self-managing. We increase their robustness and efficiency by leveraging diversity. Finally we improve application support by a new information-centric paradigm in place of the old host-centric approach. These solutions will embrace the full range of technologies, from fibre backbones to wireless and sensor networks."

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[**European Future Internet**](#)

"The European Future Internet Portal serves as the central forum for European activities and discussions on

the future of the Internet. The portal provides an overview on European research projects in the Future Internet area as well as regularly updated information on important events and other news. In addition, the portal provides a Discussion Forum - and anybody interested in the Future Internet is invited to participate. The goal of this portal is to help consolidate Europe's efforts in shaping the Internet of the future. This portal is based on the goals of the Bled Declaration, which was presented in Bled, Slovenija, on 31 March 2008."

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Spontaneous Virtual Networks - Methods for the controllability of heterogeneous communication networks

"The project aims at establishing spontaneous virtual networks in context of highly heterogeneous

communication networks that are able to provide flexible and adaptive, application-oriented and network-oriented services. It is located within the area of controllability of complex systems and quality of service in communication networks."

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FIRE: Future Internet Research and Experimentation

"The Internet, as we know it today, is almost 30 years old and has become a critical infrastructure both from a social and economic perspective. Although the original Internet design has successfully enabled multiple waves of innovation, novel societal and commercial usages are continuing to push the original Internet architecture to its limits. Not only are the basic Internet protocols now 30 years old and the Internet scale has increased by many

orders of magnitude, but it has also accreted hundreds of additional protocols and extensions, which make its management more and more complex. Unforeseen and extremely useful and popular applications, such as skype, wikipedia, facebook, youtube, have sprung up and steered the use of the Internet into directions, which were not initially anticipated, posing demanding technological and policy challenges in different domains, such as security, mobility, heterogeneity, ad-hoc connections and complexity. The solutions found so far to address these concerns are seen by some observers as "patches", which cannot last forever, and which will require a radical redesign or change of paradigms in the medium or long term. In recent years, a number of researchers and industries worldwide have started considering radically new approaches to Internet design, sometimes called "clean-slate". At the same time, other observers affirm that the current Internet is instead fully scaleable, some even suggesting that efforts to impose a new architecture are the biggest threat to long term stability and growth. The key issues related to the future of the Internet go far beyond the technological dimension. As detailed in the figure, there are strong economic, social and even ethical dimensions. Freedom of speech, distributed user-generated encyclopaedia and new applications have had a profound cultural and economic impact in nearly every sector of our societies. Social networking

sites are attracting hundreds of millions of users worldwide, mostly young people. Plus, the increasing availability of user-generated content fuels the "Web 2.0" revolution and generates complex challenges related to security, privacy and Intellectual Property Rights. Everybody, the wider public, the policy makers, and even researchers themselves, should be aware of the possible positive and negative effects and impacts of various technological choices, which face us. FIRE fulfils an increasing demand from both academic and industrial communities to bridge the gap between visionary research and large-scale experimentation, through experimentally-driven advanced research consisting of "iterative" cycles of research, design and experimentation of new networking and service architectures and paradigms addressing all levels, including horizontal research on issues such as system complexity and security. This approach needs the set-up of large-scale experimental facilities, going beyond individual project testbeds, which are also needed as validation tools, i.e. for interoperability issues. They would help in anticipating possible migration paths for technological developments, which may be potentially disruptive; in discovering new and emerging behaviours and use patterns; as well as in assessing the socio-economic implications of new technological solutions at an early stage. FIRE addresses the emerging expectations which are being put upon the

Internet, by providing a research environment for investigating and experimentally validating highly innovative and revolutionary ideas. "

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ARCADIA- Building the future internet: From fundamentals to experiments

"The objective of this strategic COST-ICT activity is to bring together the strongest networking research groups in Europe in order to:

1. define the most important areas in which both disruptive and incremental research on the Internet of the future should be conducted in Europe,
2. align these groups along both horizontal and vertical axes to advance this research,
3. architect and design a sufficiently powerful experimental infrastructure that these efforts can advance through the confrontation of novel ideas tested on a meaningful scale and exploited as real services,
4. push towards implementation of the fruits of these research efforts within both the European Research Agenda and the European Industry.

These goals will be attained via a series of workshops, culminating in a set of recommendations that will be published during the spring 2007, jointly with the COST-ARCADIA strategic workshop to be held in Berlin during the German Presidency of the EU." Arquivo: [PDF](#)

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AsiaFI : Asia Future Internet

"Asia Future Internet Forum(AsiaFI) was founded to coordinate research and development on Future Internet among countries in Asia as well as with other continents. In order to coordinate the research and development, AsiaFI carries the following activities among others."

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FIF : Future Internet Forum (Korea)

"The "Future Internet Forum" aims to provide an opportunity to review the forefront information and knowledge on the timely subject of new Internet architecture and related issues. A direction for the future R&D in Internet is expected to be shaped as a result of the presentations and discussion among the experts."

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[AKARI](#) Architecture Design Project for New Generation Network

"The AKARI Architecture Design Project aims to implement a new generation network by 2015, developing a network architecture and creating a network design based on that architecture. Our philosophy is to pursue an ideal solution by researching new network architectures from a clean slate without being impeded by existing constraints. Once these new network architectures are designed, the issue of migration from today's conditions can be considered using these design principles. Our goal is to create an overarching design of what the entire future network should be. To accomplish this vision of a future network embedded as part of

societal infrastructure, each fundamental technology or sub-architecture must be selected and the overall design simplified through integration. "

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