

Simplified NIF for GN4 Input

Purpose: This NIF form is to be used for the submission of New Ideas suggested for inclusion in the GN4 Phase1 and beyond proposals. Budget estimates, information about objectives, impact, benefits, etc. as well as scope must all be supplied.

Submit to: pmo@GÉANT.net by January 31st, 2014 with the subject label starting: GN4Input

Overview

Project Name:	Optical Spatial Division Multiplexing	Project Proposer:	Kurosh Bozorgebrahimi (UNINETT)
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Project Type: GN4 Phase1 or longer term	GN4 Phase 1	Estimated Project Costs (best effort!)	
Duration proposed	1Y	Manpower in person-months also identifying specific expertise required	6MM
Deliverables proposed (If any can be defined at this stage)	One document at the end of project	Hardware and equipment:	None
Milestones proposed (If any can be defined at this stage)	Report is ready	Other costs	None

1 Background and Reasoning

Provide background information and the context of the project. Explain the reason for the project. What do you want to be different? What do you hope to improve? Why is the project needed? This should be the reason for the project, not the solution.

Recent research on the theoretical limit on fiber capacity shows that optical spectral efficiently on fiber (G.652) at 1000km will reach the limit about 8 bit/s/Hz. Polarization Division Multiplexing will double this to 16 bit/s/Hz. The question arise is what should be done to increase spectral efficiently in order to meet future traffic demand. The researchers achieved

about 4 bit/s/Hz of spectral efficiency in the recent experimental work. This shows that a doubling of existing spectral efficiency achievement will not be possible due to fiber nonlinearity limitations on SSM fiber. Due to this limitation, researchers are looking for new type of fibers and new techniques to overcome this obstacle.

Few Mode Fiber (FMF) and Multi Core Fiber (MCF) have getting more and more attention during past two years, and new and improved FMF and MCF fibers are being reported continually. FMF and MCF make it possible to employ space as a new physical dimension to transfer data. Optical Spatial Division Multiplexing (SDM) is a new method which increase the theoretical spectral efficiency to higher level.

2 Objectives, Impact and Benefits

Provide one or more bullet points to briefly describe the primary objective(s) of the project in terms of the desired outcomes. This should be expressed in the form: 'To ensure...', 'To implement...', 'To service...', 'To improve...', 'To innovate...', 'To optimize...', 'To save...', etc. For each objective mention the benefits to identified stakeholders (e.g. end-users, NRENs, large international research projects, industrial research partners, high level education, etc.) should be mentioned. A description of the expected overall impact must also be provided.

- This task will evaluate the new FMF and MCF fibers contra the already standardized SSM fibers and evaluate the enabling technologies behind the SDM.
- Since the cost is one of the most important factor when new technologies is getting deployed the task will evaluate the cost efficiency of SDM compared to parallel fiber and DWDM system deployment.

3 Scope

Describe the areas expected to be covered or impacted by the proposed activity, such as organisational areas, systems, processes, resources.. i.e. what is 'in scope'. This is not a list of what will be done but identifying the services, areas or what, will be affected.

Also please enumerate specific items which although they could perhaps be related are intentionally not addressed by your proposal ("Out of Scope").

3.1 In Scope

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- This study will investigate the role of new fiber types (MCF and FMF) in future optical network.
 - NREN can get benefit of this investigation when planning for future deployment of fiber network structure.
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3.2 Out of Scope

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- The work will cover only Spatial Multiplexing technique in order to boost the capacity in fiber.
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4 General Information

Outline any potential issues, risks, dependencies, assumptions, constraints and limitations or any other points that may be useful to help assess the proposal.

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- This work could be done as part of JRA1. The basic idea is to go through a huge amount of research work done in this field and to find out when the technology will impact the NREN's and GEANT's networks.
 - Beside evaluation of SDM as a tool to reach higher capacity the maturity of the SDM will be investigated too. Vendor contact in order to understand their view and their technology evolution roadmap will be a part of this work too.
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