



## Indian Institute of Science

### Project Concept Note for Proposals to IISc-TCS Innovation Lab

1	Principal Investigators	S. Venugopal, Department of Chemical Engineering, IISc Tapas Chakravarty, Principal Scientist, TCS Research
2	Email address(es) of PIs	svgpal@iisc.ac.in, venu.iisc@gmail.com tapas.chakravarty@tcs.com
3	Title of the Project	<b>MetaSurface Antennas for Mobile VSAT Terminals</b>
4	Duration of the Project	<b>One year</b>
5	Motivation for the project	Parabolic dish antennas, presently used in mobile VSAT applications, are unwieldy and their manufacturing process is not easily adaptable for complex configurations. MetaSurface (Reflectarray) antenna designs based on modular patterns of metallic thin films ("Flat antennas") are lightweight and can conform to surfaces
6	What is the Problem? (30 words)	The objective is to establish a low-cost, modular and rapid prototyping technique for fabricating novel MetaSurface ("Flat") antennas designed for mobile VSAT applications
7	Your approach (50 words)	Fabrication of patterned metallic nanostructures on flexible RF compatible substrates such as Kapton using the Print-Expose-Develop technique developed at IISc. The method uses a standard desktop inkjet printer to define the metallic patterns with mm-scale features on flexible substrates
8	Outcomes, deliverables, impact, who will benefit?  How will TCS benefit?  Measures of Success (50 words)	A process for rapid prototyping of patterned metallic thin films on desired substrates for antenna applications. Potential for scalability as it is based on well-established inkjet printing technology Rapid prototyping of novel MetaSurface antenna designs developed by TCS for mobile VSAT applications. Geometric fidelity of fabricated structures (IISc) and Performance characterisation as antennas (TCS)
9	Any other info. (eg. your prior projects) (50 words)	We had earlier worked with Prof. KJ Vinoy to print ultra-wideband antenna designs on paper. We also characterised their RF performance and compared them to antennas fabricated by standard techniques. ( <a href="#">Using an Office Inkjet Printer to Define the Formation of Copper Films on Paper</a> (2013)). We have now developed the capability to print such patterns on Kapton/plastic substrates.
10	Budget Estimate with major budget lines (Be very brief here) (Don't give a detailed budget)	For fabricating desired patterns, ₹ 4.08 lakhs for one PA, ₹ 3.00 lakhs for consumables/characterisation (1 year), ₹ 1.20 lakhs for contingencies + IISc overheads (15% → ₹ 1.242 lakhs) /as per IISc-TCS agreement  <b>Total - ₹ 8.28 lakhs + overheads</b>
	Approx. time Faculty and/or Researcher would be working on the project	<b>One Year</b>

Note:

1. A maximum of 3 innovation projects and 3 research projects are planned to be funded; the average budget of an 18 months project funded in the past ranged at INR30-35Lakhs.
2. The proposal could be emailed to Mr. Ullas Pradhan, TCS at Ullas.pradhan@tcs.com with copy to Prof. Amaresh Chakrabarti at ac123@iisc.ac.in;
3. Please also copy Prof. Y Narahari at narahari@iisc.ac.in when submitting research proposals