

1. **Research Title:** *Design and Evaluation of Cross-Layer protocol for Cognitive Networks*
2. **Individual Sponsor:** Vasu Chakravarthy and James P. Stephens AFRL/SNRE
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3. **Academic Area/Field and Education Level:** *For example:* Electrical Engineering, Computer Engineering and Computer Science (MS or Ph.D. level)
4. **Objectives:** Research and develop cognitive networks pursuing end-to-end objectives that require the coordination and control of parameters from multiple network layers. Develop new cognitive techniques for acquiring, analyzing, and making decision at various network layers to achieve global objectives. Refine and categorize mechanisms for analysis of a cognitive network system and the accompanying cross-layer interactions. Create new metrics to analyze the performance and outline the design trade space of the cognitive networks and their cross-layer behaviors
5. **Description:** The proposed project will advance the field of cognitive networks by investigating their cross-layer implications. Cognitive networks are defined as communication networks that can perceive current network conditions and then plan, decide and act on those conditions to meet end-to-end objectives. This project will focus on cognitive networks consisting of networks of radios, in which a cognitive process must make decisions using some subset of the parameters of the network stack. The cognitive networks must be able to balance the local goals of the network devices and functional layers against the end-to-end objectives of the network. It must also be able to coordinate these decisions across devices and network layers. Finally, the network must make observations of the correct kind and quality such that these decisions are “good enough,” and then have adequate control over the network to effectively implement them.
6. **Research Classification/Restrictions:** This research is Unclassified.
7. **Interest in Summer USAFA Cadet (Avg Cost for USAF Cadet for 33 days was \$4000)**

1. **Eligible Research Institutions:**

Universities (DAGSI)

AF (only)

USAFA