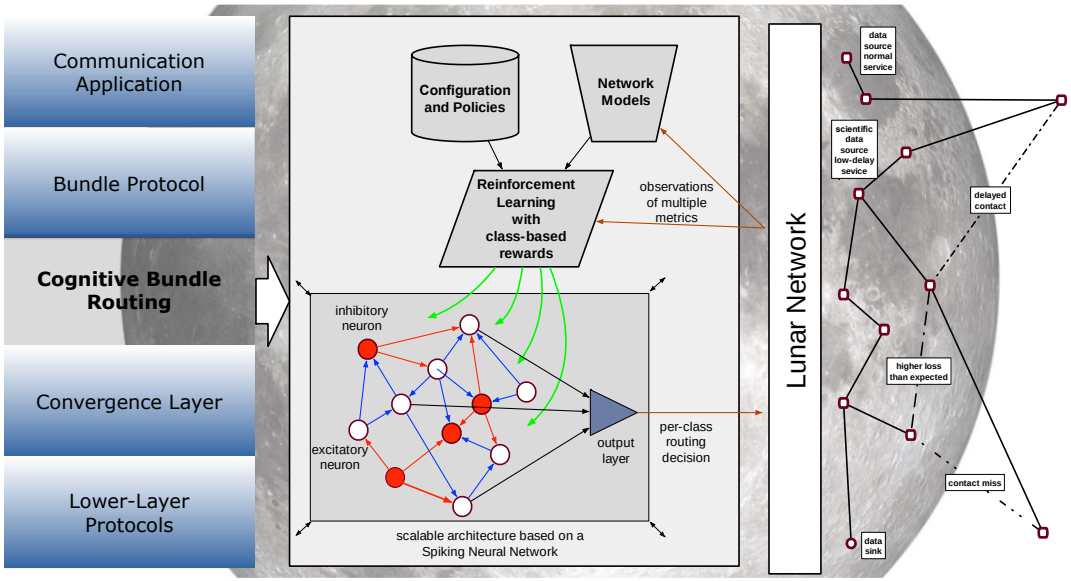
A Scalable and QoS-Driven Cognitive Routing Capability for Lunar Delay-Tolerant Networks

PI: Ricardo Lent
University of Houston

RESEARCH OBJECTIVES

Create a cognitive routing approach for Delay-Tolerant Networking (DTN) that considers the low predictability of a complex Lunar network of heterogeneous assets carrying concurrent communications with dissimilar requirements

Focus on achieving autonomy, scalability, differentiated service levels, and interoperability with the Bundle Protocol



APPROACH

- Construct a scalable route decision unit based on biologically-realistic neuron models (spiking neurons) and robust reinforcement learning that can work with uncertain rewards
- Formulate multivariable routing objectives that are customizable to meet the relevant system and mission requirements
- Discover new knowledge of the Lunar DTN performance with the system affected by adverse network conditions and deviations from the initial configuration using stochastic and simulation modeling
- Extensive experimental validation

POTENTIAL IMPACT

- Improves the return-of-investment by maximizing the end-to-end data-carrying capacity of mixed communication assets
- Allows operating a complex Lunar DTN that lacks the predictability required by the standard DTN protocols, with target metrics beyond latency
- Helps to transform the space DTN approach into a self-optimizing autonomous system
- Advances the state-of-the-art DTN and cognitive networking
- Start TRL: 1, projected end TRL: 3