Edmund Gunn Jr
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EG3573
HW1
MG8203

AI-Powered 6G Beam Management System - Project Value Proposition

You've probably noticed that 5G on your phone feels fast. Today's mid-band 5G networks typically use frequencies around 3.5 GHz and deliver peak speeds up to 1 Gigabit per second (Gbps). In our early 6G experiments, we're using a much higher frequency band at 28 GHz. Although "28" might look like a small number, higher radio frequencies carry far more data. At 28 GHz, we can potentially achieve 10–20 Gbps. This is life-altering faster than today's 5G. However, right now our 6G prototype still "hunts" for the best signal path, adding about 40 milliseconds of delay. That tiny pause can ruin experiences like mobile VR, cloud gaming, or self-driving-car communications. If we don't fix this, our 6G system won't meet its performance targets, and we'll lose our lead in next-generation wireless research.

We'll use machine learning (a type of artificial intelligence) to predict the best signal path instantly, removing the need for lengthy searches. Our goals are to cut connection-setup time in half (from 40ms down to under 20ms), boost real-world data speeds by at least 20%, and reduce extra network control traffic by 30%, freeing more room for user data. For our timeline and budget, we forecast 4 months and $120,000 total. Cloud computing credits ($60,000) to rent powerful cloud GPUs; software tools ($10,000) for MATLAB and Python licenses; graduate research assistants ($50,000) covering one full-time and one half-time student (total 1.5 FTE) to collect data, run experiments, and integrate the solution.

To turn this idea into a full project plan (including schedule, detailed budget, and risk assessment), we request $20,000 in additional cloud-GPU credits for ongoing AI training, procurement of two on-site NVIDIA A100 GPU servers ($40,000) to support real-time testing without cloud-induced delays, and funding for two graduate research assistants, each for three months. They will handle data collection, model tuning, and field trials. With these resources secured, we will deliver a complete project plan in six weeks, ready for formal approval and kickoff.

May we proceed with allocating these resources and formally begin the planning phase?

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Why This Matters

- 5G uses ~3.5 GHz, speeds up to 1 Gbps
- 6G prototype at 28 GHz offers potential 10–20 Gbps
- Current beam training adds ~40 ms delay

What We Will Do & Cost

- Use AI to shorten setup time by 50%
- Boost speeds ≥20% & reduce control traffic by ≥30%
- Budget: Cloud GPUs $60K; Software $10K; Research Assistants $50K (1 FT + 1 PT)

Next Steps & Ask

- Request $20K extra cloud-GPU credits
- Acquire 2 NVIDIA A100 servers ($40K)
- Hire 1 FT + 1 PT RA (1.5 FTE)
- Deliver full project plan in 6 weeks
- May we proceed with allocating these resources?

Appendix / Backup Slides

What is Beam Training?

- Beam training is the process of finding the best directional signal paths (beams) between transmitter and receiver to maximize link quality.
- Traditional approach sweeps through all beam directions—this adds about 40 ms delay.

Key Terms / Glossary

- 5G: Fifth-generation mobile network using ~3.5 GHz, up to 1 Gbps.
- 6G: Experimental next-gen network using 28 GHz, potential 10–20 Gbps.
- GHz (Gigahertz): Unit of frequency; billions of signal cycles per second.
- Beam Training: Process of discovering optimal signal directions (beams).
- Machine Learning (AI): Algorithms that learn patterns from data to make predictions.
- GPU: Graphics Processing Unit; specialized hardware used in AI training.