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Critical Perspectives: Ben Chang

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The mind has an extraordinary ability to see things that are hoped for, Arthur C. Clarke said in 1973. Years later he noted that it cost about $100, in terms of kilowatt-hours, to go to the moon, "whereas it costs about a billion dollars the way we've done it."

These two quotes from the grandfather of satellite communications and author of 2001: A SPACE ODYSSEY point to one of the primary qualities INTELSAT looks for in filling engineering positions: the ability to apply book knowledge to the practical aspects of satellite communications.

The fact that the design of a satellite looks good on paper doesn't necessarily mean that it will fly. The fact that all of the theoretical aspects of space technologies can be worked out in the most complex equations doesn't matter if the cost of building the equipment can't be justified. Often, a very simple sanity check will bring us back down to earth.

I am reminded of my first job out of college. It became very clear to me early on that there was a serious disconnect between my university knowledge and the innerworkings of the satellite industry. I had a lot of things to learn and I spent at least a year trying to bring myself up to speed on the practical side of the business while trying to learn my day-to-day job.

A solid foundation in the basics is important. Electrical engineering, mechanical engineering, engineering mechanics, physics, applied mathematics and related disciplines are extremely helpful when working in the satellite industry. However, it will be beneficial in employment when students also have a basic knowledge in space communications, spacecraft design, propulsion and orbital mechanics.

Basic engineering classes in circuit theory, electronics, communication theory and thermodynamics are essential for what we do. With those foundational courses, the next logical step for students interested in satellite communications would be an overview of communication satellites, followed by spacecraft communication system design.

Students in other disciplines should also take courses that will provide an overview of communication satellites and subsystem design. This approach will give students some idea of how satellites and launch vehicles work, while reducing the amount of training required on-the-job.

These classes aren't always available in university curricula. However, visiting professionals and guest speakers can be invited to campus. These can greatly enrich the curriculum and augment satellite communication education. In addition, internships may be found among member organizations of the aerospace community. The Arthur C. Clarke Foundation of the United States offers fellowships and scholarships to students studying satellite applications and related topics.

Any sufficiently advanced technology, said Clarke, is indistinguishable from magic. For the engineering student seeking employment in the satellite communication sector, the magic is in being able to visualize a cost-effective satellite that will actually fly. This requires bridging university learning with the art and science of building successful spacecraft and launch vehicles.

Knowledge + Practical Application = Employment

Ben Chang is Vice President, Satellite Engineering and Program Management, at Intelsat. With customers in approximately 200 countries and territories, Intelsat offers telephony, corporate network and broadcast and Internet solutions around the globe via capacity on 22 geosynchronous satellites. For further information, visit Intelsat.