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Revolutions in Global Networking and Collaborations, and the Digital Divide¹

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The major physics experiments of the next twenty five years, such as those at the Large Hadron Collider and the International Linear Collider, will break new ground in our understanding of the fundamental interactions, structures and symmetries that govern the nature of matter and spacetime. In order to realize the scientific wealth of these experimental programs, physicists have formed global-scale collaborations and built grid systems where the data is processed, distributed and collaboratively analyzed using networked computing facilities at more than 100 sites around the world. Effective use of these emerging ensembles of facilities and networks presents new challenges in Petabyte-scale data access, processing and distribution, and collaboration across national and international networks on a scale unprecedented in the history of science. The key to meeting these challenges is the effective use of data networks. The bandwidth use by high energy physicists, paralleled by scientists in other fields of data intensive science, continues to grow at several hundred times per decade, and there are indications that this growth is accelerating. This is helping to drive the growth of the major networks serving research and education, as well as mission-oriented networks in the US, Europe, Asia-Pacific, Latin America and across the Atlantic and Pacific oceans. Physicists and computer scientists have together made striking technological advances in recent years, and have developed tools that allow full use of long range 10 gigabit/sec links on a routine basis for the first time. As the science community continues to advance in its development of networks and grid systems, a key concern is the rising Digital Divide between the favored and less-favored regions of the world. Closing the Divide is vital for the health of our global collaborations and our field. In this talk I will review these trends, and focus on the means to reduce the Digital Divide, from the perspective of the Standing Committee on Inter-regional Connectivity of the International Committee on Future Accelerators.

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