# Intel and QinetiQ Collaborate On Transistor Research

February 9 2005

The results of a two-year joint research programme by Intel Corporation and QinetiQ into new transistor technology that could become a promising candidate for making microprocessors in the middle of the next decade was made public today. Transistors are the tiny switches in microprocessors that process the ones and zeros of the digital world.

Researchers from the two companies have successfully built 'quantum well' transistors by integrating a new transistor material, pioneered by QinetiQ called indium antimonide (InSb). InSb is made up of elements found in the III and V columns of the periodic table. Transistors made of this material enable research devices to operate at very low voltages, while still rapidly switching and consuming little power. The research results obtained from the quantum well transistors research showed a 10x lower power consumption for the same performance, or conversely a 3x improvement in transistor performance for the same power consumption, as compared to today's traditional transistors.

"The experimental results of our joint research with QinetiQ demonstrate that indium antimonide is a promising material for potential integration in future transistors," said Ken David, director of components research for Intel's Technology and Manufacturing Group. "Indium antimonide is one example of several new materials that Intel will continue to investigate in order to ensure that Moore's Law extends well beyond the next decade."

"We first developed Indium antimonide transistor technology as part of a

UK Ministry of Defence project," added Tim Phillips, business manager of the Fast Transistors group at QinetiQ. "And although this research is still in the initial phase it still shows huge promise for advanced applications. It is also a great example of how QinetiQ, by working with other world leading companies like Intel, is commercialising many of its technologies."

The culmination of a two-year collaboration between Intel and QinetiQ on the research and development of III V transistors for high-performance and low power logic applications, the results were obtained on a "depletion mode" InSb NMOS transistor. Such transistors are normally on and can be turned off by applying a negative voltage to the gate which is in contrast to the more common practice of applying a voltage to switch a gate, when required.