IPARP Processing

More efficient handling

Tue, Jul 23, 2002

The IPARP system table is used as an arp cache in the IRM systems, but for both the IRM and PowerPC versions of the system, it provides the associated UDP port numbers known from each node, and it thereby provides for interpreting pseudo node numbers, each of which refers to a UDP socket in a particular node. In the PowerPC systems, nonvolatile memory access time is slow, and most system tables, including IPARP reside in nonvolatile memory. A concerted effort to reduce the need for accesses to slow memory in normal operation has been underway recently. This note describes how normal processing using the IPARP table might be handled in dynamic memory.

During initialization of the PowerPC systems following reset, the IPARP table is populated completely, deriving what it needs, such as the local IP address, from the underlying vxWorks kernel. This is almost the entire story, except for the IP security table. This table is located at the end of the IPARP static allocation, and it is initialized manually, usually via the Memory Dump page. This means that a copy of the table could be built in dynamic memory, but we must take care to notice changes made to the nonvolatile copy in the security table part of the structure.

The IPARP table, if it is to continue to house the IP security parameters, must be represented in the system table directory as being in nonvolatile memory. Upon initialization, however, a volatile memory copy can be made of the security table and appended to the volatile memory copy of the IPARP table that is in actual use. The volatile system table directory copy (at `0x00000d00`) should be modified to refer to the copied table in volatile memory. The `IPARPPtr` system global should also point to the copied table. These modifications should assure that all uses of the table target the copied table that resides in volatile memory.

A monitoring routine should be called to notice changes that might be made to the nonvolatile version of the IP security table. There are 2K bytes reserved for this table, which allows for 32 records of 64 bytes each, 56 bytes of which are diagnostic information about recent setting activities. The other 8 bytes is the only portion of each 64 bytes that must be preserved across system resets. If the monitoring routine is called every 15 Hz cycle, and if it checks one 8 byte value against the volatile memory copy, then a manual change in this portion of the table would be noticed within about 2 seconds, which is probably prompt enough for humans. This check would only require two accesses to nonvolatile memory and would therefore cost about 2–3 μs per 15 Hz cycle, an extremely modest load.