ENT-AN1226

Application Note

SimpliPHY™ Initialization for Energy Efficient Ethernet

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Microsemi
a Microchip company

Contents

1 Revision History 1.0

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 1.0

Revision 1.0 of this document was published in December 2018. This was the first publication.

2 SimpliPHY™ Initialization for Energy Efficient Ethernet

Microsemi's VSC8541 family of Ethernet PHYs support the IEEE 802.3az-2010 Energy Efficient Ethernet (EEE) standard to provide a method for reducing power consumption on an Ethernet link during low utilization. In order to avoid certain link state errors that could result in link drops and packet loss, the PHY's physical coding sublayer (PCS) must be updated with settings related to EEE in order to improve performance.

This document provides an initialization sequence for the VSC8541 PHY family that can achieve uninterrupted link performance with only minor PCS errors related to EEE operation (including false carriers, spurious start-of-stream detection, and EEE wake errors).

The target audience for this document is hardware and software engineers planning to use the PHY in an EEE application. For more information, consult the IEEE 802.3 CSMA/CD-Access Method and Physical Layer Specification.

2.1 EEE Initialization Sequence

To ensure optimal link performance, the following initialization sequence should be applied after initialization of the PHY for any application that enables EEE capabilities in the VSC8541 family of devices.

The command format is as follows, where PortNo is the SMI address for this device on the MDIO bus:

```
PhyWrite(PortNo, Register (dec), 16_bit_unsigned_data(hex) );
16_bit_unsigned_data = PhyRead( PortNo, Register (dec) );
```

This sequence programs the device through SMI register read-modify-writes for improved EEE performance.

```
PhyWrite(PortNo, 31, 0x52b5)
PhyWrite(PortNo, 17, 0xb00a)
PhyWrite(PortNo, 18, 0x0012)
PhyWrite(PortNo, 16, 0x8f82)
PhyWrite(PortNo, 17, 0x0004)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x9686)
PhyWrite(PortNo, 17, 0xc46f)
PhyWrite(PortNo, 18, 0x00d2)
PhyWrite(PortNo, 16, 0x968c)
PhyWrite(PortNo, 17, 0x0620)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x97a2)
PhyWrite(PortNo, 17, 0xffdd)
PhyWrite(PortNo, 18, 0x00ee)
PhyWrite(PortNo, 16, 0x96a0)
PhyWrite(PortNo, 17, 0x1448)
PhyWrite(PortNo, 18, 0x0007)
PhyWrite(PortNo, 16, 0x96a6)
PhyWrite(PortNo, 17, 0x132f)
PhyWrite(PortNo, 18, 0x0013)
PhyWrite(PortNo, 16, 0x96a4)
PhyWrite(PortNo, 17, 0x0000)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x96a8)
PhyWrite(PortNo, 17, 0xa028)
PhyWrite(PortNo, 18, 0x00c0)
```

```
PhyWrite(PortNo, 16, 0x8ffc)
PhyWrite(PortNo, 17, 0xb06c)
PhyWrite(PortNo, 18, 0x0091)
PhyWrite(PortNo, 16, 0x8fe8)
PhyWrite(PortNo, 17, 0x1600)
PhyWrite(PortNo, 18, 0x0004)
PhyWrite(PortNo, 16, 0x8fea)
PhyWrite(PortNo, 17, 0x0af4)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x8f80)
PhyWrite(PortNo, 17, 0x1809)
PhyWrite(PortNo, 18, 0x0090)
PhyWrite(PortNo, 16, 0x8fec)
PhyWrite(PortNo, 17, 0xa6a1)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x8fee)
PhyWrite(PortNo, 17, 0x1007)
PhyWrite(PortNo, 18, 0x00b0)
PhyWrite(PortNo, 16, 0x8ffe)
PhyWrite(PortNo, 17, 0xff00)
PhyWrite(PortNo, 18, 0x00ee)
PhyWrite(PortNo, 16, 0x96b0)
PhyWrite(PortNo, 17, 0x7000)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x96b2)
PhyWrite(PortNo, 17, 0x0814)
PhyWrite(PortNo, 18, 0x0000)
PhyWrite(PortNo, 16, 0x96b4)
PhyWrite(PortNo, 31, 0x0000)
```

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