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## Security Advisory for FL Switch GHS articles utilizing VxWorks

### Advisory Title

Vulnerabilities in the Interpeak IP-stack used in Wind River VxWorks.

### Advisory ID

VDE-2020-002  
CVE-2019-12255 (TCP Urgent Pointer)  
CVE-2019-12258 (DoS via malformed TCP options)

### Vulnerability Description

#### CVS-2019-12255

Wind River VxWorks has a Buffer Overflow in the TCP component (issue 1 of 4). This is an IPNET security vulnerability: TCP Urgent Pointer = 0 that leads to an integer underflow.

The vulnerability affects a little-known feature of the TCP/IP protocol, sending out-of-band data, also known as urgent data. Although the feature is rarely used in the real world, its implementation, consisting of an “Urgent Flag” and an “Urgent Pointer”, is present in the header of every TCP packet. Exploiting these vulnerabilities does therefore not depend on any specific configuration. If a VxWorks device communicates using the TCP protocol, it is vulnerable. It also does not matter which side initiates a TCP connection. An attacker can exploit the vulnerabilities if the VxWorks device is operated as a server that accepts TCP connections, if the VxWorks device connects to a malicious host operated by the attacker, or as a man-in-the-middle, manipulating a TCP connection between the VxWorks device and a legitimate host.

#### CVE-2019-12258

Personally liable partner:  
Phoenix Contact Verwaltungs GmbH  
Amtsgericht Lemgo HRB 5273  
Kom. Ges. Amtsgericht Lemgo HRA 3746

Executive Vice Presidents:  
Frank Stührenberg (CEO)  
Roland Bent  
Prof. Dr. Gunther Olesch  
Axel Wachholz

Deutsche Bank AG  
(BLZ 360 700 50) 226 2665 00  
BIC: DEUTDE33XXX  
IBAN:  
DE93 3607 0050 0226 2665 00

Commerzbank AG  
(BLZ 476 400 51) 226 0396 00  
BIC: COBADE33XXX  
IBAN:  
DE31 4764 0051 0226 0396 00

This vulnerability affects established TCP sessions. An attacker who can figure out the source and destination TCP port and IP addresses of a session can inject invalid TCP segments into the flow, causing the TCP session to be reset.

### **Affected products**

| Article no | Article                | Affected versions |
|------------|------------------------|-------------------|
| 2700271    | FL Switch GHS 4G/12    | <= 3.3.0          |
| 2700786    | FL Switch GHS 4G/12-L3 | <= 3.3.0          |
| 2700787    | FL Switch GHS 12G/8-L3 | <= 3.3.0          |
| 2989200    | FL Switch GHS 12G/8    | <= 3.3.0          |

### **Impact**

#### CVS-2019-12255

An attacker can either hijack an existing TCP session and inject bad TCP segments, or establish a new TCP session on any TCP port the victim system listens to. The impact of the vulnerability is a buffer overflow of up to a full TCP receive-window.

#### CVE-2019-12258

This vulnerability affects established TCP sessions. An attacker who can figure out the source and destination TCP port and IP addresses of a session can inject invalid TCP segments into the flow, causing the TCP session to be reset.

### **Classification of Vulnerability**

#### CVS-2019-12255

Base Score: 9.8

Vector: CVSS: CVSS:3.0/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H

#### CVE-2019-12258

Base Score: 7.5

Vector: CVSS:3.0/AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H

### **Temporary Fix / Mitigation**

Users are strongly recommended to install a firewall between the FL Switch GHS device and other parts of the network where an attacker may reside. The firewall needs to be configured in a way that either TCP packets with urgent flag are dropped or that the corresponding TCP connection the packet belongs to is terminated.

It needs to be noticed that the urgent flag is a very rarely used feature. Thus, implementing the described firewall rule will most likely not harm usual network operation.

Phoenix Contact recommends operating network-capable devices in closed networks or protected with a suitable firewall. For detailed information on our recommendations for measures to protect network-capable devices, please refer to our application note:

[Art.-Nr. 107913: AH EN INDUSTRIAL SECURITY “Measures to protect network-capable devices with Ethernet connection against unauthorized access”](#)

Please also refer to our whitepaper regarding [Urgent/11](#).

### **Acknowledgement**

The vulnerabilities in VxWorks were published by Wind River Systems, Inc.