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Manchester East Westcad System

Software crash – August 2015

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Background

- Between July 25th and August 3rd 2015 a new RRI for the former Romiley SB area was commissioned and re-controlled to the Manchester East SCC Westcad System, which was already operational with three medium to large RRIs

- During the week, the new RRI was initially connected to a "local" Westcad, then following successful testing, to the real MESCC Workstations for a test train run.

- During the run, a Windows NT exception error was presented, but without any corresponding Westcad or TD alarms – all looked normal until it was spotted that the test train description was no longer "with" the train.

- The consequence was that TD stepping on the entire Workstation was halted without any indication as to why, resulting in difficulty in regulating services through what is a very busy area.

Site Configuration

Manchester East is a SCC installation using "Classic" Westcad but with a Dual-Parallel Workstation arrangement. It controls Ashburys, Guide Bridge, Stalybridge and Romiley RRIs with no ARS

- Two Operators

- Windows NT

- Compact PCI

- Separate TD system

- Four Remote RRI
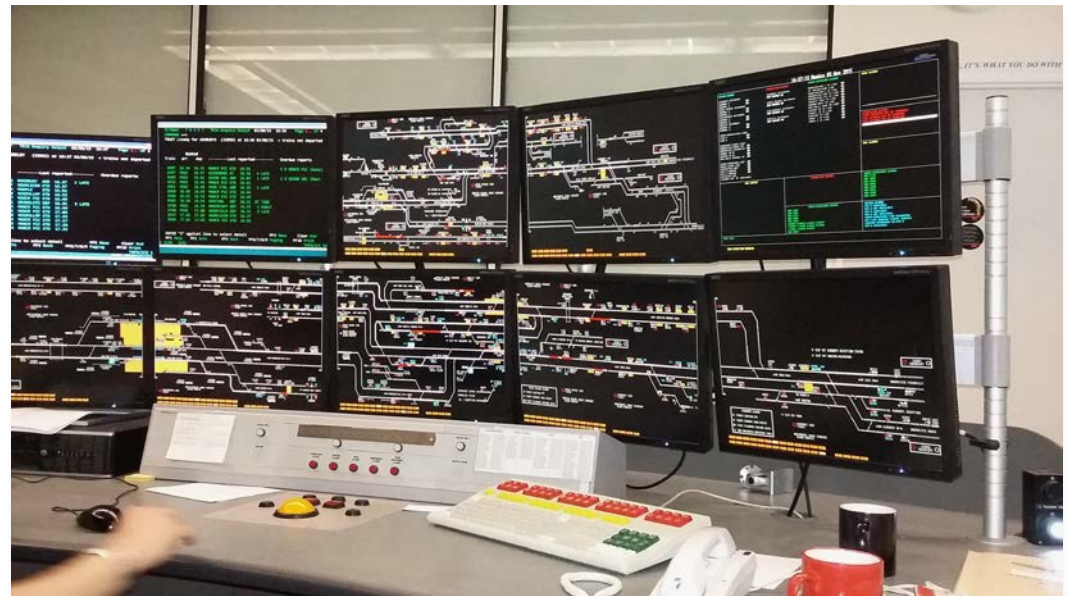
Manchester East Westcad

- The root cause was confirmed to be the failure of a Westcad Application (app) called SIG1810.EXE. This is a legacy Westcad app which had not received an update for many years.

- SIG1810.EXE passes signalling changes-of-state to external systems (e.g. A TD) using NR's PS9 protocol. It is configured with a "look-up" table in a bit-byte format, listing the states it needs to transmit.

- The way in which SIG1810.EXE used Windows extended memory was not well documented, nor were its validated limits (discovered to be 80bytes of data), and as a consequence although it mostly worked for all instances, there were occasions when it did not.

- SIG1810.EXE did not include a watchdog monitor, such that if it crashed, the core Westcad system would keep working without reporting a fault.

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- Manchester East was first commissioned in November 2011 using Westcad release 3.2 and with one RRI (circa first 20bytes of data)

- The policy on software updates was one of "only when necessary". The new data was built to release 3.5 sp2 as the latest release at project start-up (Dec13). SIG1810.EXE was however still at an old version in this.

- The build was tested off-site (on different hardware) and worked reliably.

- The build was installed on-site on July 25th 2015 and no problems were apparent, however at this time the new RRI was NOT connected to MESCC. Instead, an identical build was installed on a local Westcad (running WinXP) at Romiley Relay Room for the Testers, but no TD was provided.

- The existing MESCC continued to operate fine on the new build on the existing three RRI's (with 64bytes of operational data)

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- When the Romiley build was installed (25th) the number of bytes had increased to 94, but *without* the RRI actually connected, no changes of state were happening in the >80byte area. Thus, SIG1810.EXE continued to work – it didn't need to address this "higher" area of memory.

- When the RRI *was* connected (Sun 2nd) and the test train run (Mon 3rd), various signalling functions began to become active, and resulted in data in the >byte 80 area of SIG1810.EXE's look-up file needing to be addressed. This crashed the application due it attempting to access memory that was already in use by another application. This had not been evident in the factory (different hardware) or out at the RRI (different hardware *and* Operating System)

- By Midday 3rd Aug, a revised build to release 3.6 sp2 was ready (which included a revised SIG1810.EXE with both a higher upper limit and Watchdog Monitor). This was installed and cured the problem.
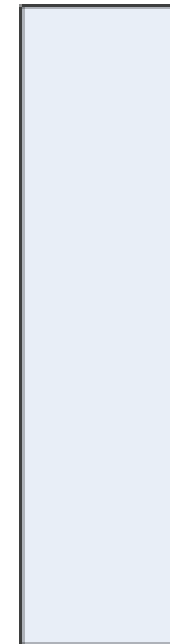
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Upper Memory Area >

Validated 80-byte limit >
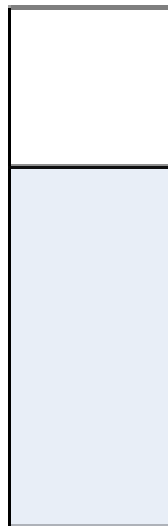
Glasgow and "local" Westcad set up: Although SIG1810 had exceeded its 80-byte limit and accessed the upper area nothing else was using it, so it did not crash

MESCC – another application was already using the upper area, so when SIG1810 tried to access it it was denied by Windows and halted

Release 3.6 SP2: A much greater limit has been allocated to SIG1810

Action Taken

- Due to a good on-site presence of the right people, the issue was identified quickly and resolved.

- Operations played an excellent part in being able to provide both dual signaller and dual booking clerk roles to run the morning's trains with minimal impact - The project only suffered 122mins of delay.

- Working with Siemens, IP were able to agree with Operations to perform a mid-service update without impacting the operational railway, rather than wait until the end of service and risk more delay.

Lessons Learned

- It is imperative to fully understand the limitations of the system you are working on. When expanding existing systems with both older hardware and older versions of Operating Systems and Application Software there may be hidden issues.

- Given the duration some projects spend in G5-8, checking solely at the start as to what is the latest build is not enough. Some form of regular review is needed to ensure a defect caught (and rectified) at another site is not allowed to find its way into a subsequent new commission later on.

- SIG1810.EXE had indeed already been updated (by Chippenham) due to this error being discovered on another site, but the project team (Glasgow) had not been informed of its significance. A product application guide or manual should provide guidance.

Further information…

For any further details or information please contact:

Steve Whelan, Senior Project Engineer (Systems)

07917 577 612

steve.whelan@networkrail.co.uk