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February 7, 2017

Via Email
Jeffrey Goldthorp
Chief, Communications Systems Analysis Division
Public Safety and Homeland Security Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: NRSC Cause Code Consistency Task Force Recommendations

Dear Mr. Goldthorp:

On behalf of its Network Reliability Steering Committee (NRSC), the Alliance for Telecommunications Industry Solutions (ATIS) is writing to provide you with NRSC's recommendations regarding NORS Cause Codes.

The FCC has expressed interest in improving the consistency of Cause Code usage across the industry. The NRSC recognizes the Cause Code definitions and the definitions of direct and root causes are confusing, resulting in inconsistent use. Based on this, the NRSC established the Cause Code Consistency Task Force to conduct a review of the current Cause Codes and Direct/Root Cause definitions and has completed a thorough analysis.

Attached are worksheets detailing the NRSC's recommendations to add, delete, and modify the Cause Codes in order to promote greater consistency in the use of these codes. Additionally, the NRSC recommends how the codes should be used (for Direct Cause, Root Cause, or both) based on the NRSC's proposed definitions of Direct Cause and Root Cause.

If you have any questions or need additional information, please let me know.

Regards,

Thomas Goode
ATIS General Counsel

cc: John Healy, john.healy@fcc.gov
Julia Tu, julia.tu@fcc.gov
David Ahn, david.ahn@fcc.gov

Cause Code	Definition	Suggested Use
Recommended Additions		
Environment (External) - Construction/Road Work	Component destruction associated with construction or road work (outside the requirements of One Call/811, where available)	Direct
Environmental (External) - Access Restricted	Component access restricted or denied (e.g. due to safety/security concerns) causing an inability to service or maintain network components	Direct
Diversity Failure - Customer Specified Single Circuit	Failure to diversify circuits due to customer request	Root
Hardware Failure - Device Reset or Reseated	Hardware found to be in condition that required resetting or reseating the device to restore to working condition	Both
Hardware Failure - Inadequate Grounding	Grounding design was adequate but incorrectly implemented	Both
Planned Maintenance - Customer/Vendor	Outage occurred during customer/vendor planned maintenance outside the control of the service provider	Both

Cause Code	Reason for Deletion
Recommended Deletions	

Environment External - Ice/Storm

Duplicate

Power Failure () Inadequate Site Specific Power
Contingency Plan

Rarely used

Power Failure() Scheduled Activity Software Upgrade

Duplicate – Planned maintenance

Power Failure () Scheduled Maintenance Hardware
Replacement

Duplicate – Planned maintenance

Original Cause Code	Suggested Revisions	Final Cause Code	Original Definition	Suggested Revisions	Final Definition	Rationale
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Recommended Revisions (Word Changes or Deletions Indicated in Red)

Cable Damage – Digging Error	no changes	Cable Damage – Digging Error	Excavator error during digging (contractor provided accurate notification, route was accurately located and marked, and cable was buried at a proper depth with sufficient clearance from other sub-surface structures)	Excavator Error during digging (contractor provided accurate notification was provided , route was accurately located and /marked, and cable was buried at a proper depth with sufficient clearance from other sub-surface structures)	Error during digging (accurate notification was provided, route was accurately located/marked, and cable was buried at a proper depth with sufficient clearance from other sub-surface structures)	Clarification
Cable Damage/Malfunction - Aerial/Non-Buried	no changes	Cable Damage/Malfunction - Aerial/Non-Buried	Aerial/non-buried cable was damaged or ceased to function (e.g., power transformer fire, tension on span, automobile collision, etc.)	Aerial/non-buried cable was damaged or ceased to function (e.g., power transformer fire, tension on span, automobile collision, vehicular incident , etc.)	Aerial/non-buried cable was damaged or ceased to function (e.g., power transformer fire, tension on span, vehicular incident, etc.)	Clarification to include trucks, vans, etc.
Cable Damage/Malfunction - Cable Malfunction	Cable Damage/ Malfunction – Cable Malfunction- Underground/Buried	Cable Malfunction – Underground/Buried	Cable ceased to function (e.g., loss of transmission due to aging, connector failure, etc.)	Underground/buried cable ceased to function (e.g., loss of transmission due to aging, connector failure, normal wear and tear , etc.)	Underground/buried cable ceased to function (e.g., loss of transmission due to aging, connector failure, normal wear and tear, etc.)	Aerial cables covered by other Cause Codes
Design - Firmware - Insufficient Software State Indications	no changes	Design - Firmware - Insufficient Software State Indications	Failure to communicate or display out-of-service firmware states; failure to identify, communicate or display indolent or "sleepy" firmware states	Failure of the firmware to communicate or display out-of-service firmware states (e.g., silent firmware failure) (failure to identify, communicate or display indolent or "sleepy" firmware states)	Failure of the firmware to communicate or display out-of-service states (e.g., silent firmware failure)	Clarification
Design – Software – Faulty Software Load – Office Data	Design – Software – Faulty Software Load – Office Data- Translations	Design – Software – Faulty Software Translations	Inaccurate/mismatched office configuration data used/applied; wrong/defective office load supplied	Inaccurate/mismatched office-translations/routing configuration data supplied/used/applied;- wrong/defective office load supplied	Inaccurate/mismatched translations/routing configuration data supplied/used/applied	Clarification
– Design - Software - Faulty Software Load - Program Data	Design – Software – Faulty Software Load – Program Data	Design – Software – Faulty Software – Program Data	Bad program code/instructions; logical errors/incompatibility between features/sets; software quality control failure; wrong/defective program load supplied; software vulnerability to virus infection	Failure or fault in a computer program or system that causes it to produce an incorrect or unexpected result or behave in unintended ways (e.g., bad program code/instructions; logical errors/incompatibility between features/sets; software quality control failure; wrong/defective program load supplied; software vulnerability to virus infection)	Failure or fault in a computer program or system that causes it to produce an incorrect or unexpected result or behave in unintended ways (e.g., bad program code/instructions; logical errors/incompatibility between features/sets; software quality control failure; wrong/defective program load supplied; software vulnerability to virus infection)	Clarification

Environment (External) - Flood	no changes	Environment (External) - Flood	None Provided	Component destruction or loss associated with flooding causing the submersion of equipment or facilities	Component destruction or loss associated with flooding causing the submersion of equipment or facilities	Needed Definition
Environment (External) - Storm - Water/Ice	no changes	Environment (External) - Storm - Water/Ice	Component destruction or fault associated with fog, rain, hail, sleet, snow, or the accumulation of water/ice (flooding, collapse under weight of snow, etc.)	Component destruction or fault associated with fog, rain, hail, sleet, snow, or the accumulation of water/ice (e.g. flooding -collapse under weight of snow, ice accumulation on lines, micro-bending due to ice, etc.)	Component destruction or fault associated with fog, rain, hail, sleet, snow, or the accumulation of water/ice (e.g. collapse under weight of snow, ice accumulation on lines, micro-bending due to ice, etc.)	Flooding is a separate category
Environment (External) - Storm - Wind/Trees	no changes	Environment (External) - Storm - Wind/Trees	Component destruction or fault associated with wind-borne debris or falling trees/limbs.	Component destruction or fault associated with wind, wind-borne debris or falling trees/limbs. This could be a result of a hurricane, tornado, or other wind storm	Component destruction or fault associated with wind, wind-borne debris or falling trees/limbs. This could be a result of a hurricane, tornado, or other wind storm	Clarification
Environment (External) - Vehicular Accident	Environment (External) - Vehicular Accident Incident	Environment (External) - Vehicular Incident	Component destruction or fault associated with vehicle (car, truck, train, etc.) collision	None	Component destruction or fault associated with vehicle (car, truck, train, etc.) collision	Clarification – not necessarily accident
Hardware Failure - Memory Unit Failure	no changes	Hardware Failure - Memory Unit Failure	None Provided	Memory component of hardware failed	Memory component of hardware failed	Needed Definition
Hardware Failure - Peripheral Unit Failure	no changes	Hardware Failure - Peripheral Unit Failure	None Provided	Failure of components such as mouse, keyboard, DVD drive, etc	Failure of components such as mouse, keyboard, DVD drive, etc	Needed Definition
Hardware Failure - Processor Community Failure	no changes	Needs to be updated	None Provided	None	Needs a definition, no suggestions from NRSC	Definition Unknown
Power Failure (Commercial and/or Back-up) - Battery Failure	no changes	Power Failure (Commercial and/or Back-up) - Battery Failure	Batteries did not function as designed	Batteries did not function as designed or batteries exhausted	Batteries did not function as designed or batteries exhausted	For Completeness

Spare On Hand – Manufacturer Discontinued (MD)	Spare On Hand – Manufacturer Discontinued (MD)	Spare – Manufacturer Discontinued (MD)	Obtaining spare made difficult or complicated by MD'd status (e.g., Service Provider unaware of MD'd status, scarcity of MD's spares, etc.)	None	Obtaining spare made difficult or complicated by MD'd status (e.g., Service Provider unaware of MD'd status, scarcity of MD's spares, etc.)	If on hand, would not have had problem
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Cause Code	Suggested Use
Root or Direct Cause- NRSC Proposed Use	
NRSC Proposed Direct Cause Definition	The Direct Cause is the immediate event, action, or procedure that triggered the reportable incident (i.e., what happened).
NRSC Proposed Root Cause Definition	The Root Cause is the primary problem which once identified and corrected will prevent the same or a similar reportable incident from recurring (i.e., why the reportable incident happened). A Root Cause should be actionable.

Cable Damage Cause Codes

Cable Damage - Cable unlocated	Both
Cable Damage - Digging Error	Both
Cable Damage - Inadequate/No Notification	Both
Cable Damage - Inaccurate/Incomplete Cable Locate	Both
Cable Damage - Shallow Cable	Both
Cable Damage - Other	Both
Cable Damage/Malfunction - Aerial/Non-Buried	Both

Design Firmware/Hardware Cause Codes

Design - Firmware - Ineffective fault recovery or re-initialization action	Root
Design - Firmware - Insufficient Software State Indications	Root
Design - Firmware - Other	Both

Design - Hardware - Inadequate Grounding Strategy Root

Design - Hardware - Poor Backplane or Pin Arrangement Root

Design - Hardware - Poor Card/Frame Mechanisms
(latches, slots, jacks, etc.) Root

Design - Hardware - Other Both

Design Software Cause Codes

Design - Software - Faulty Software Load - Office Data Root

Design - Software - Faulty Software Load - Program Data Root

Design - Software - Inadequate Defensive Checks Root

Design - Software - Ineffective Fault Recovery or Re-
initialization Action Root

Design - Software - Other Both

Diversity Failure Cause Codes

Diversity Failure - External Root

Diversity Failure - Links Root

Diversity Failure - Power Root

Diversity Failure - Timing Equipment Root

Diversity Failure - Internal (Other) Both

Environment External Cause Codes

Environment (External) - Earthquake Direct

Environment (External) - Fire Direct

Environment (External) - Lightning/Transient Voltage Direct

Environment (External) - Storm - Water/Ice Direct

Environment (External) - Storm - Wind/Trees Direct

Environment (External) - Vandalism/Theft Direct

Environment (External) - Vehicular Accident Direct

Environment (External) - Other Direct

Environment (External) - Animal Damage Direct

Environment (External) - Flood	Direct
Environment (External) - Ice/Storm	Direct
Environment Internal Cause Codes	
Environment (Internal) - Cable Pressurization Failure	Both
Environment (Internal) - Dirt, Dust Contamination	Both
Environment (Internal) - Environmental System Failure (heat/humidity)	Both
Environment (Internal) - Fire, Arcing, Smoke Damage	Both
Environment (Internal) - Fire Suppression (water, chemicals) Damage	Both
Environment (Internal) - Manhole/Cable Vault Leak	Both
Environment (Internal) - Roof/Air Conditioning Leak	Both
Environment (Internal) - Other	Both
Hardware Failure Cause Codes	
Hardware Failure - Memory Unit Failure	Both
Hardware Failure - Peripheral Unit Failure	Both
Hardware Failure - Processor Community Failure	Both
Hardware Failure - Other	Both
Hardware Failure - Circuit Pack/Card Failure-Processor	Both
Hardware Failure - Circuit Pack/Card Failure-Other	Both
Hardware Failure - Passive Devices	Both
Hardware Failure - Self-contained Device Failure	Both
Hardware Failure - Shelf/Slot Failure	Both
Hardware Failure - Software Storage Media Failure	Both
Planned Maintenance Cause Codes	
Planned maintenance to upgrade the system	Both
Planned maintenance to fix known problems	Both
Planned maintenance - failed	Both
Planned maintenance - went longer or worse than expected	Both
Power Failure Cause Codes	
Power Failure (Commercial and/or Back-up) - Battery Failure	Both
Power Failure (Commercial and/or Back-up) - Extended Commercial Power Failure	Both

Power Failure (Commercial and/or Back-up) - Generator Failure	Both
Power Failure (Commercial and/or Back-up) - Inadequate/Missing Power Alarm	Both
Power Failure (Commercial and/or Back-up) - Inadequate Site-Specific Power Contingency Plans	Both
Power Failure (Commercial and/or Back-up) - Insufficient Response to Power Alarm	Root
Power Failure (Commercial and/or Back-up) - Lack of Power Redundancy	Both
Power Failure (Commercial and/or Back-up) - Lack of Routine Maintenance/Testing	Root
Power Failure (Commercial and/or Back-up) - Overloaded/Undersized Power Equipment	Both
Power Failure (Commercial and/or Back-up) - Other	Both
Power Failure (Commercial and/or Back-up) - Rectifier Failure	Both
Power Failure (Commercial and/or Back-up) - Breaker Tripped/Blown Fuses	Both
Power Failure (Commercial and/or Back-up) - Scheduled Activity - Software Upgrade	Both
Power Failure (Commercial and/or Back-up) - Scheduled Maintenance - Hardware Replacement	Both
Power Failure (Commercial and/or Back-up) - Unidentified Power Surge	Both
Power Failure (Commercial and/or Back-up) - Inadequate back-up Power Equipment Located on Customer Premise	Both
Procedural Other Vendor Cause Codes	
Procedural - Other Vendor - Ad hoc Activities, Outside Scope of MOP	Root
Procedural - Other Vendor - Documentation/Procedures Out-of-Date, Unusable, Impractical	Root
Procedural - Other Vendor - Documentation/Procedures Unavailable, Incomplete	Root

Procedural - Other Vendor - Insufficient Supervision/Control or Employee Error	Root
Procedural - Other Vendor - Insufficient Training	Root
Procedural - Other Vendor - Other	Both
Procedural - Other Vendor - Insufficient Staffing/Support	Root
Procedural Service Provider Cause Codes	
Procedural - Service Provider - Documentation/Procedures Out-of-Date Unusable or Impractical	Root
Procedural - Service Provider - Documentation/Procedures Unavailable/Unclear/Incomplete	Root
Procedural - Service Provider - Inadequate Routine Maintenance/Memory Back-Up	Root
Procedural - Service Provider - Insufficient Staffing/Support	Root
Procedural - Service Provider - Insufficient Supervision/Control or Employee Error	Root
Procedural - Service Provider - Insufficient Training	Root
Procedural - Service Provider - Other	Both
Simplex/Spare Cause Codes	
Simplex Condition - Non-service Affecting	Both
Simplex Condition - Service Affecting	Both
Spare Not Available	Root
Spare On Hand - Failed	Root
Spare On Hand - Manufacturer Discontinued (MD)	Root
Traffic/System Overload Cause Codes	
Traffic/System Overload - Common Channel Signaling Network Overload	Both
Traffic/System Overload - Inappropriate/Insufficient Network Management (NM) control(s)	Both
Traffic/System Overload - Ineffective Engineering/Engineering Tools	Both

Traffic/System Overload - Mass Calling - Focused/Diffuse Network Overload	Both
Traffic/System Overload - Media-Stimulated Calling - Insufficient Notification	Both
Traffic/System Overload - Other	Both
Insufficient Data Cause Codes	
Insufficient Data	Both
Other/Unknown	Both
Insufficient Data - Cleared While Testing	Both
Insufficient Data - Non-Service Provider Personnel	Both
Insufficient Data - Outside Owned Network	Both
Insufficient Data - Under Investigation	Both