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Telecommunications
Engineers***

**ENGINEERING COMMITTEE
Energy Management Subcommittee**

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**Cable Facility Classification Definitions and
Requirements**

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1. Introduction

1.1. Executive Summary

This document presents a five tier classification approach to provide cable operators with a framework in which to categorize facilities and critical infrastructure, prioritize investment decisions, establish availability expectations, and to define performance levels for the cable industry.

1.2. Scope

This SCTE standard defines classes of critical facilities along with expected performance availability across five classes of structures thus creating a common nomenclature for critical facilities.

1.3. Benefits

A key benefit of this document is the creation of a common framework that can be utilized to benchmark and score an operator's critical facilities. Facility classification allows for prioritization and effective decision making with respect to allocation of capital funds for both new and existing facilities. Finally, the promotion of an increased level of consistency in both the design and performance of an operator's critical facilities are in an effort to improve overall reliability from both an industry and individual cable operator's perspective.

1.4. Intended Audience

The intended audience of this standard includes critical facility designers, operators, and engineers.

1.5. Areas for Further Investigation or to be Added in Future Versions

Energy consumption per the five classification tiers could be examined in a future release.

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents might not be compatible with the referenced version.

2.1. SCTE References

- No normative references are applicable.

2.2. Standards from Other Organizations

- TIA 942: Telecommunications Infrastructure Standard for Data Centers
https://global.ihs.com/search_res.cfm?RID=TIA&org_code=TIA&INPUT_DOC_NUMBER=ANSI/TIA-942
- NFPA 70E: Standard for Electrical Safety in the Workplace
<http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=70e>
- International Building Code:
<http://shop.iccsafe.org/2015-international-building-coder.html>

- National Electric Code (NEC):
<http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=70>

2.3. Published Materials

- No normative references are applicable.

3. Informative References

The following documents might provide valuable information to the reader but are not required when complying with this document.

3.1. SCTE References

- EMS-027: Recommended Practice for Cable Facility Design Process

3.2. Standards from Other Organizations

- No informative references are applicable.

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

<i>shall</i>	This word or the adjective “ <i>required</i> ” means that the item is an absolute requirement of this document.
<i>shall not</i>	This phrase means that the item is an absolute prohibition of this document.
<i>forbidden</i>	This word means the value specified shall never be used.
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<i>deprecated</i>	Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of this document. Implementations should avoid use of deprecated features.

5. Abbreviations and Definitions

5.1. Abbreviations

AC	air conditioning
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AHJ	authority having jurisdiction
BDFB	battery distribution fuse bay
DC	direct current
G	permanent standby emergency generator
mph	miles per hour
OTP	optical transition point
PG	portable emergency standby generator
PUE	power usage effectiveness
RPP	remote power panel
SMATV	satellite master antenna television system
TIA	Telecommunications Industry Association
TVSS	transient voltage surge suppressor
UPS	uninterruptible power supply

5.2. Definitions

core aggregation	A critical facility for network traffic aggregation and distribution. Connected to the <i>core network</i> supporting <i>edge</i> facilities.
core network	The central part of a telecommunications network that provides various services to customers who are connected via an <i>access network</i> .
data center	A critical facility for housing computers, data storage, network transport and associated components to support service delivery, customer facing applications and back office automation.
headend	A critical cable facility that is primarily used for receiving video signals for processing and distribution to an operator's <i>core network</i> .
hub	A critical cable facility that receives processed video signals from a headend or data center and combines those signals with other services like high speed data and voice for distribution directly to the <i>access network</i>
OTP	A critical facility for transport aggregation or extension to support the <i>edge</i> facility's service delivery and typically contains amplifiers for optical links or transmitters and receivers feeding optical nodes.
SMATV	A legacy critical facility for receiving video signals for processing and distribution directly to the customer, where no connection to an Operator's <i>core network</i> exists.

5.3. Regional Area Definitions

access network	Part of a telecommunications network which connects subscribers to edge or regional critical facilities, i.e. outside plant. Critical facility's function would be to extend services directly connected to the customer, where need is based on fiber consolidation or distance restraints
edge	Usually used to define a small subset of a company's entire service area. Generally a small city or a few small municipalities. Critical facility's function would be to provide support of services directly connected to the customer.
market	Usually used to define a large subset of a company's entire service area. Generally a single state or an isolated geographical area. Critical

	facility’s function would be to provide support to <i>regional</i> and <i>edge</i> facilities.
national	Usually used to define a company’s entire service area. Generally greater than a single state or isolated geographical area. Critical facility’s function would be to provide support to <i>market</i> and <i>regional</i> facilities
regional	Usually used to define a medium subset of a company’s entire service area. Generally a county or urban area. Critical facility’s function would be to provide support of services directly connected to the customer and support to <i>edge</i> facilities.

6. Cable Operator Critical Facility Classification Descriptions

Prior to this publication, cable operators have varying language for discussing the various buildings or facilities responsible for service delivery to customers. A number of other institutions such as Uptime Institute as well as Telecommunications Industry Association (TIA) have published documents that define various levels of performance depending on expected availability and design specifications. The following cable specific reference serves as the basis for the definitions of various classes of cable operator facilities. Note, both Uptime and TIA have been reviewed and influence reflected where appropriate in this document.

6.1 Classification Quick Reference

The following simplified table looks to serve as a quick reference to our definitions of what each class requirements reference.


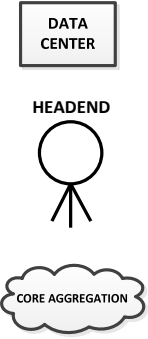
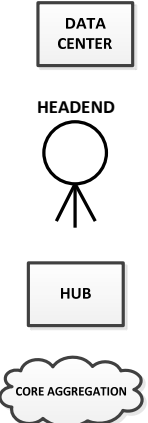


CLASSIFICATION	CLASS A	CLASS B	CLASS C	CLASS D	CLASS E
GEOGRAPHIC AREA	ENTERPRISE/NATIONAL	MARKET	REGION	EDGE	OUTSIDE PLANT/ ACCESS NETWORK
PRIMARY FUNCTION					

Figure 1 - Cable Operator Facility Classes and Legacy Terminology

6.2 Classification Requirements to Meet Design Availability

In order to meet industry classification designations, cable operators *shall* comply with the following minimum specifications found in Table 1 respectively.

Table 1 - Cable Operator Critical Facility Classifications

	Class A	Class B	Class C	Class D	Class E
Design Availability	99.999%	99.998%	99.997%	99.995%	99.990%
Critical System Design Redundancy	Concurrently maintainable with single fault event	Concurrently maintainable with single fault event	Component redundancy with some concurrent maintainable systems	Component redundancy	Limited redundancy
Classification Definitions	Facility to house equipment and systems that are mission critical to the entire enterprise or organization which if removed from service could potentially impact 100% of an Operator's customer base.	Facility to house equipment and systems that are mission critical to a section of the enterprise or organization which if removed from service could potentially impact 25% to 100% of an Operator's customer base.	Facility to house equipment and systems that are critical to a localized footprint which if removed from service could potentially impact 10% to 50% of an Operator's customer base.	Facility to house equipment and systems that are critical to a localized footprint which if removed from service could potentially impact 2% to 25% of an Operator's customer base.	Facility to house equipment and systems that are critical to a localized network segment which if removed from service could potentially impact <2% of an Operator's customer base.
Site / Structure					
Wind Requirement	30 mph above wind speed map requirements; and no less than 120 mph	30 mph above wind speed map requirements; and no less than 120 mph	30 mph above wind speed map requirements; and no less than 120 mph	30 mph above wind speed map requirements; and no less than 120 mph	To building code
Seismic Requirements	Meet or exceed local seismic requirements	Meet or exceed local seismic requirements	Meet or exceed local seismic requirements	Meet or exceed local seismic requirements	Meet or exceed local seismic requirements
Flood Plain	Elevated above and not located within 100 year flood plain	Elevated above and not located within 100 year flood plain	Elevated above 100 year flood plain	Elevated above 100 year flood plain	No requirement 100 year flood plain
Security	Access control, video surveillance, bollards, perimeter fencing, etc.	Access control, video surveillance, bollards, perimeter fencing, etc.	Access control, video surveillance, bollards, perimeter fencing, etc.	Access control, video surveillance, bollards, perimeter fencing, etc.	Bollards
Electrical Topology					
Utility	Single primary utility feed to redundant distribution	Single primary utility feed to redundant distribution	Single utility feed	Single utility feed	Single utility feed

	Class A	Class B	Class C	Class D	Class E
	pathway (Service Entrance)	pathway (Service Entrance)			
Distribution	Redundant electrical bus	Redundant electrical bus	Single bus	Single bus	Single bus
Standby Generator	N+1	N+1	N+1	N	No Requirement
PG Connection	Recommended	Recommended	Recommended	Required	Required
Generator Fuel Storage	Fuel for 72 hours; tank sharing applicable	Fuel for 48 hours; tank sharing applicable	Fuel for 48 hours; tank sharing applicable	Fuel for 48 hours	No requirement
Uninterruptible Systems (UPS, Inverters and DC Plants)					
Plant/Module Redundancy	2N	2N	2N	N+(Module Requirement)	N
Plant Redundancy	Redundant systems	Redundant systems	Redundant systems	Single system	Single system
Module/Component Redundancy	Recommended	Recommended	Recommended	Required	No requirement
Distribution	Redundant distribution to the critical load with downstream switching implemented for single corded devices	Redundant distribution to the critical load with downstream switching implemented for single corded devices	Redundant distribution with downstream switching implemented for single corded devices	Single distribution to the critical load	Single distribution to the critical load
Site Minimum Battery Backup Time	15 minutes with minimum 2 strings per system	20 minutes with minimum 2 strings per system	60 minutes with minimum 2 strings per system	180 minutes with minimum 2 strings per system	240 minutes
Miscellaneous Electrical					
Grounding	As required per National Electric Code	As required per National Electric Code	As required per National Electric Code	As required per National Electric Code	As required per National Electric Code
Lightning Protection System	Required	Required	Recommended	Recommended	Recommended
Emergency Power Off (EPO)	<u>Not recommended</u> unless required by AHJ	<u>Not recommended</u> unless required by AHJ	<u>Not recommended</u> unless required by AHJ	<u>Not recommended</u> unless required by AHJ	<u>Not recommended</u> unless required by AHJ
Coordination and Arc Flash Study	Required	Required	Required	Required	Recommended
Mechanical Topology					
Equipment Redundancy	N+1	N+1	N+1	N+1	N

	Class A	Class B	Class C	Class D	Class E
Electrical service to Mechanical equipment	<i>Shall</i> have multiple paths to air conditioning equipment	<i>Shall</i> have multiple paths to air conditioning equipment	Single distribution	Single distribution	Single distribution
Mechanical systems on standby power	Required	Required	Required	Required	Recommended
Humidity Control	Required	Required	Recommended	Recommended	Recommended
Hardware Orientation	Hot aisle/cold aisle	Hot aisle/cold aisle	Hot aisle/cold aisle	Hot aisle/cold aisle	No requirement
Fire Detection	Required	Required	Required	Required	Required
Fire Suppression	Multi-Stage Release Sprinkler System <i>Should</i> fight with clean agent first, water as last resort	Same	Same	Probably no water so only clean agent	No requirement
Telecommunications					
Access Provider Entrances	Diversely routed entrances <i>should</i> be 20 feet with non-adjacent walls	Diversely routed entrances <i>should</i> be 20 feet with non-adjacent walls	Diversely routed entrances <i>should</i> be 20 feet	Diversely routed entrances <i>should</i> be 20 feet	No requirement
Redundant Backbone Cabling and Pathways	Required	Required	Required	Required	No requirement
Redundant Horizontal Cabling and Pathways	Required	Required	Required	Required	No requirement
Operations					
Preventative Maintenance	Comprehensive program	Comprehensive program	Comprehensive program	Comprehensive program	Comprehensive program
Monitoring	Comprehensive monitoring	Comprehensive monitoring	Comprehensive monitoring	Comprehensive monitoring	Basic monitoring
Efficiency					
Metering	Electrical and mechanical component level metering	Electrical and mechanical component level metering	Electrical and mechanical systems level metering	Electrical systems level metering	Metering from utility bills
LEED® Certification	Evaluate and Apply as possible	Evaluate and Apply as possible	Evaluate and Apply as possible	Evaluate and Apply as possible	No Requirement

	Class A	Class B	Class C	Class D	Class E
Design Annualized PUE	<2	<2	<2	<1.8	<1.6
Building Envelope	Meet or exceed IECC requirements for commercial structures	Meet or exceed IECC requirements for commercial structures	Meet or exceed IECC requirements for commercial structures	Meet or exceed IECC requirements for commercial structures	No Requirement

6.3 Classification “Simple” Riser Diagram Examples

The following drawings represent allowable implementation variations for each individual classification where basic classification criteria are achieved. These drawings are not intended set design boundaries; rather, they provide the reader visual representation of the established minimum criteria within each facility class.

6.3.1 Drawing Element Legend

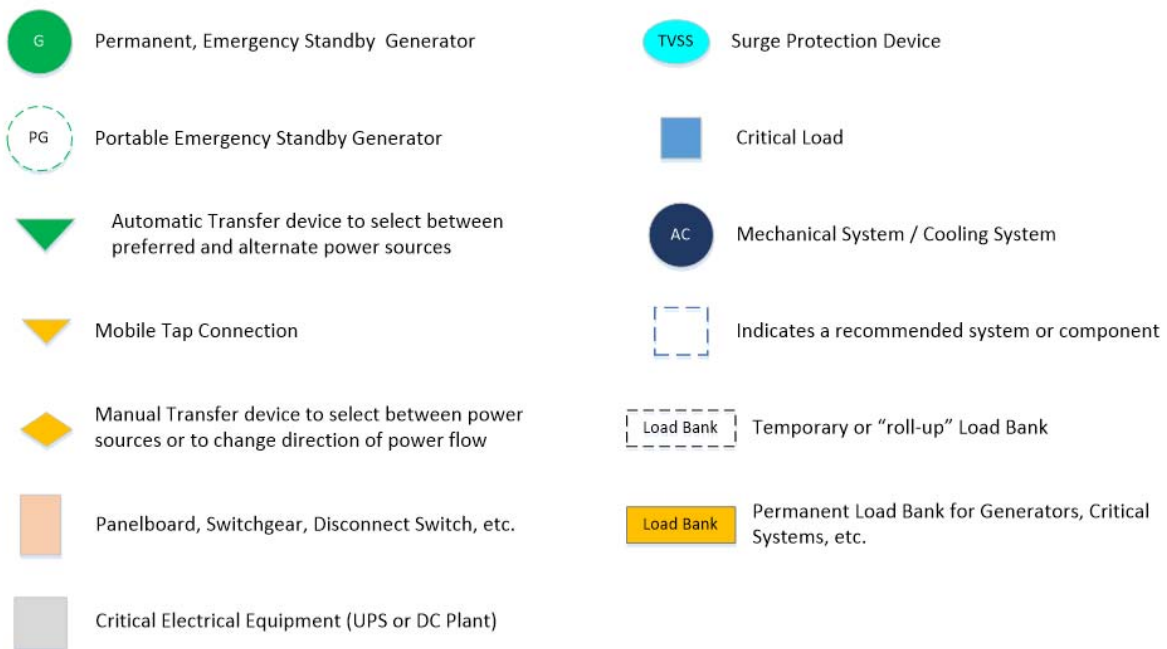


Figure 2 - Riser Diagram Element Legend

6.3.2 Class A Facility Riser Example

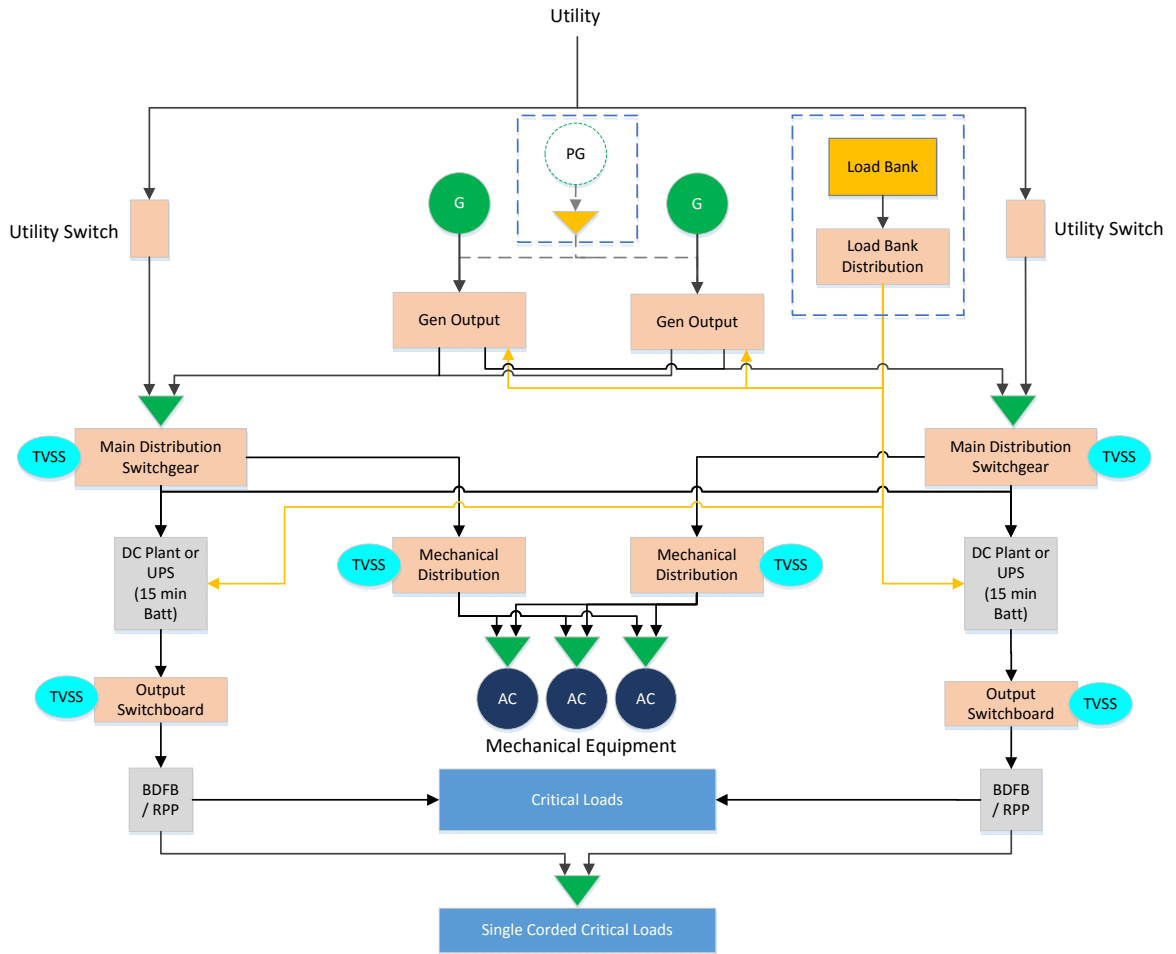


Figure 3 - Class A Facility Riser Diagram

6.3.3 Class B Facility Riser Example

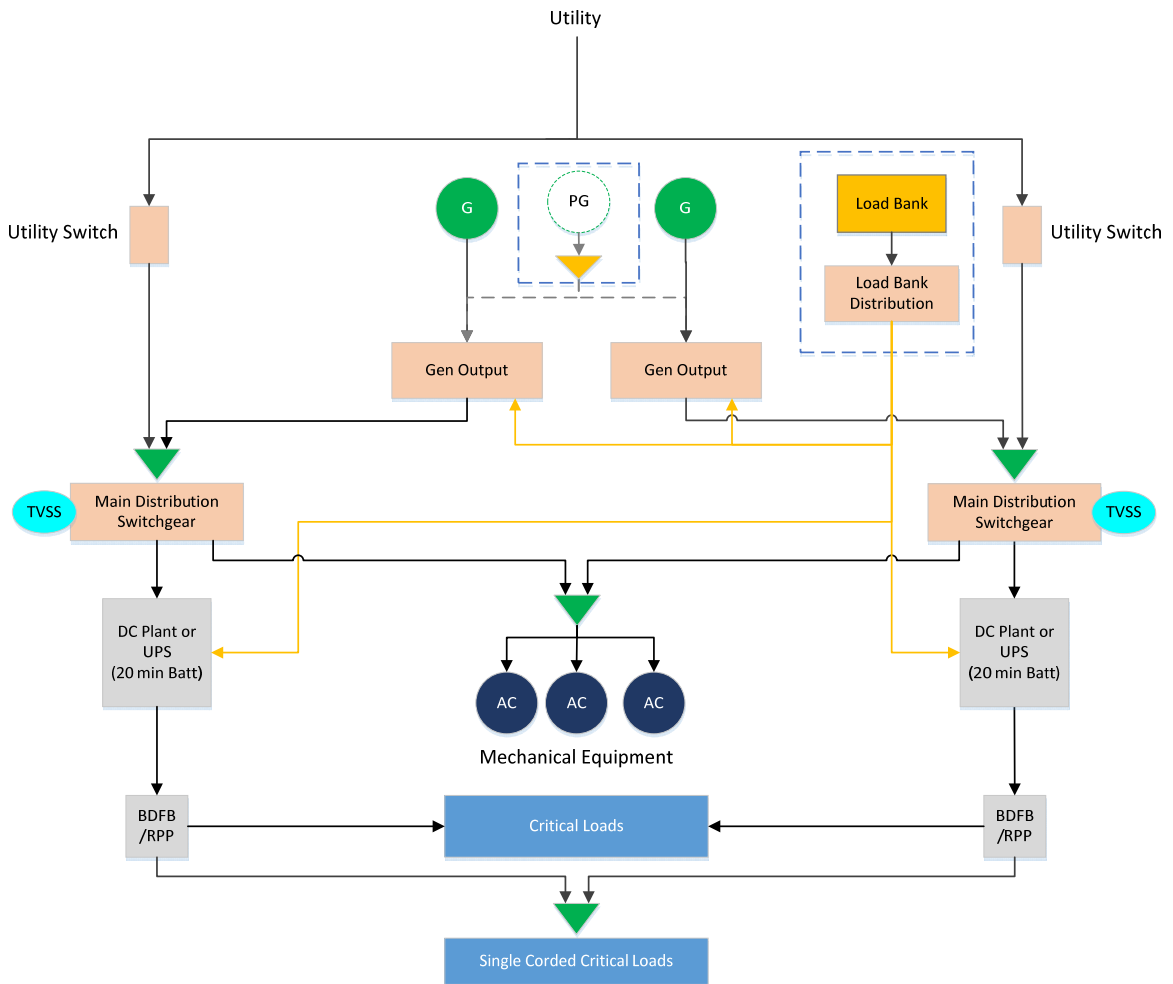


Figure 4 - Class B Facility Riser Diagram

6.3.4 Class C Facility Riser Example

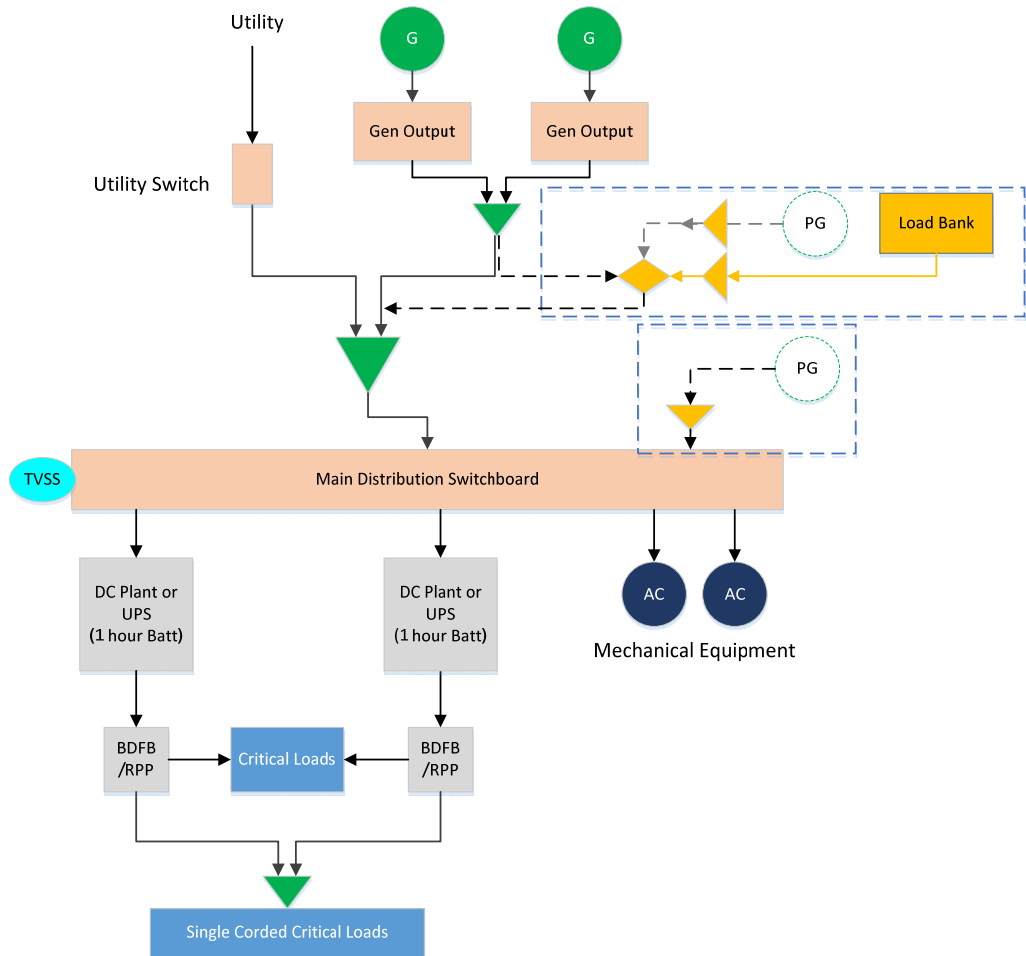


Figure 5 - Class C Facility Riser Diagram

6.3.5 Class D Facility Riser Example

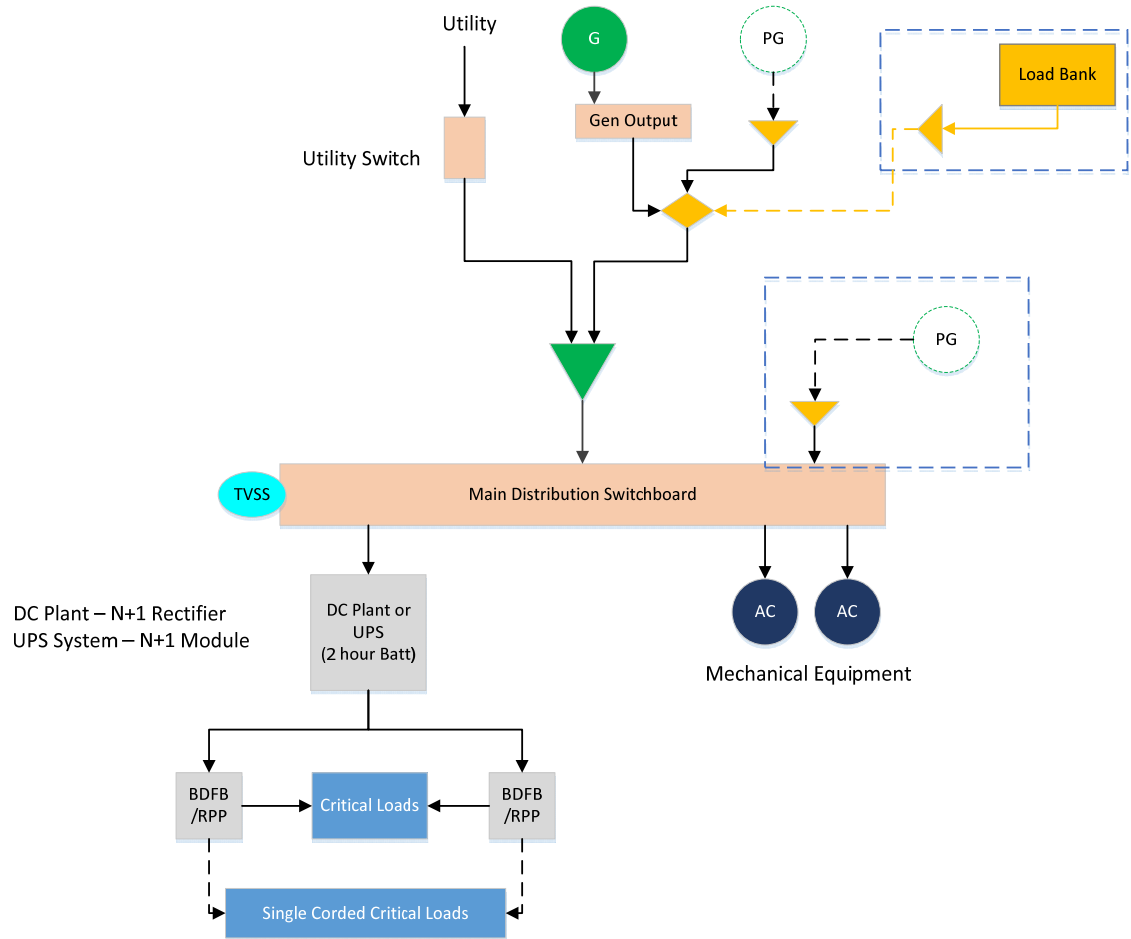


Figure 6 - Class D Facility Riser Diagram

6.3.6 Class E Facility Riser Example

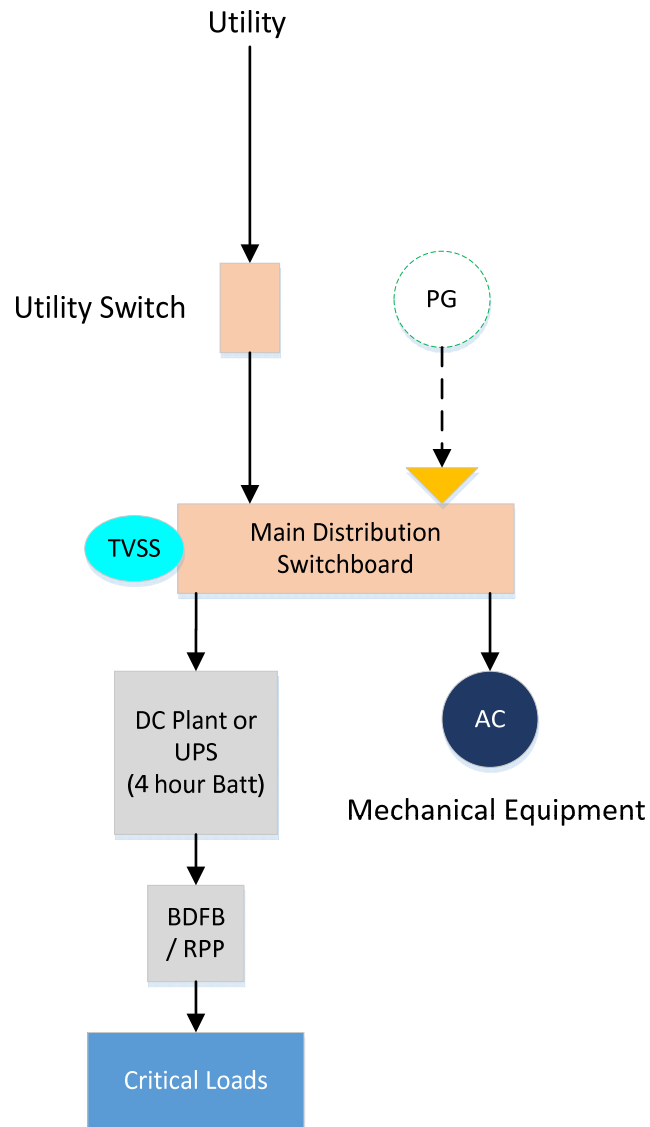


Figure 7 - Class E Facility Riser Diagram

7. Cable Operator Critical Facility Classification Conclusion

The cable industry provides a vast array of services to its customers, and the foundation of these services depends largely on the critical facilities for video, voice and data. Classification and ultimately what expectation for performance from a power and infrastructure perspective has traditionally varied from operator to operator. With the publication of the Cable Facility Classification Definitions and Criteria standard, there are clear definitions of what the expected infrastructure *should* be based on service class. Finally, the industry now has a key standardized guide to continue to categorize facilities and critical infrastructure, prioritize investment decisions, establish availability expectations, and to define performance levels for the cable industry ultimately leading to greater customer satisfaction and reduced operator cost.