

Southern System Restoration Procedures & "Your Role"

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September 30, 2010
Transmission Customer Forum
Destin, Florida

Topics

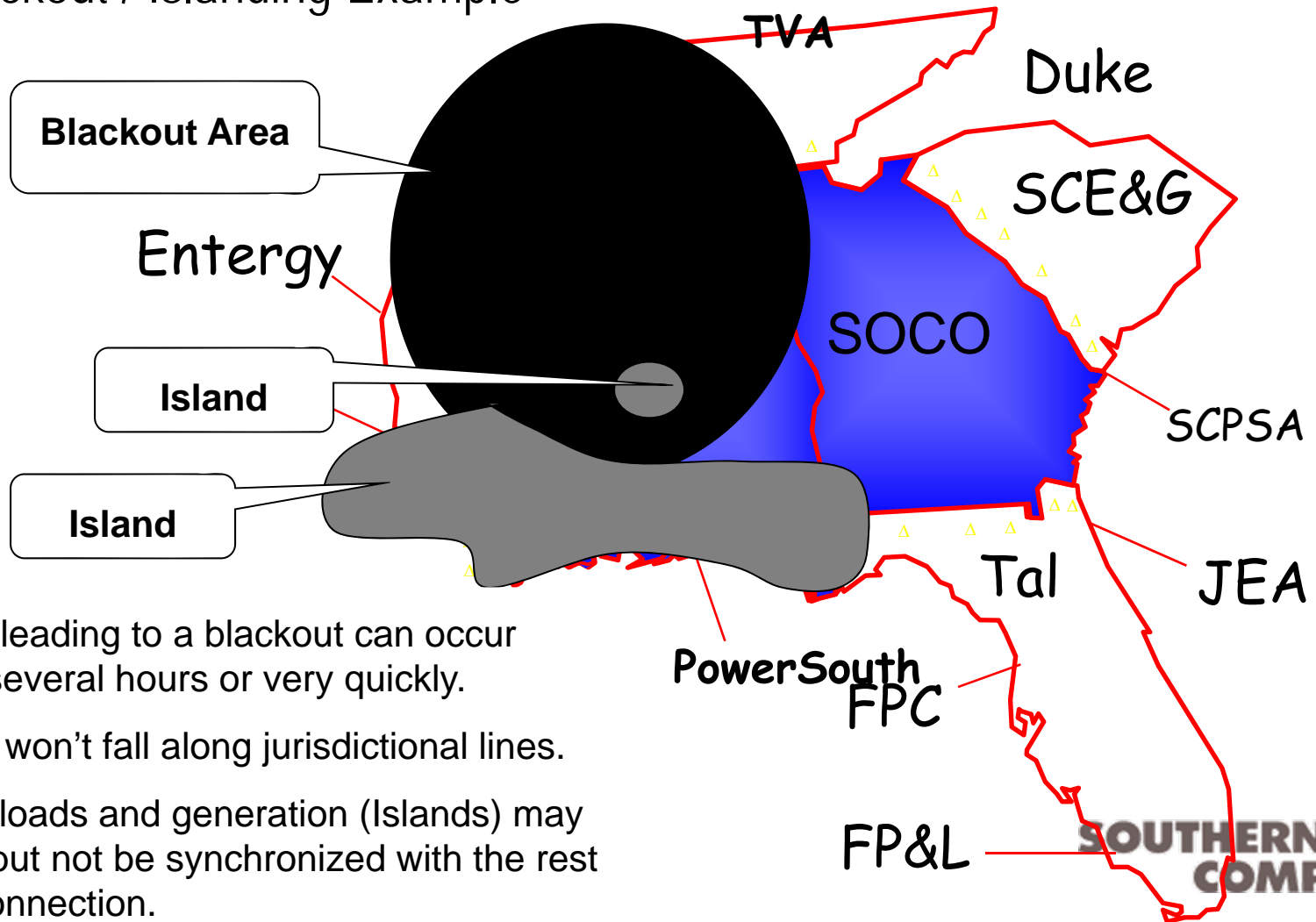
- Blackstart Terms
- Blackout / Islanding Example
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- Generator Role
- Constant Frequency Operation
- 2010 SERC Reliability Corporation Blackout Restoration Exercise
- Questions

Blackstart Terms

- A blackout is an event which creates a widespread electrical outage possibly resulting in “islands” of generators and loads.
- A blackstart plan is utilized to restore the system to operation as safely and as quickly as possible. Sometimes called a restoration plan
- Blackstart units are generating units that can start and synchronize to the system without having an outside (system) source of power.

ISAT GeoStar 45
23:15 EST 14 Aug. 2003

Blackout / Islanding Example



Blackout Area

Entergy

Island

Island

TVA

Duke

SCE&G

SOCO

SCPSA

Tal

JEA

PowerSouth
FPC

FP&L

- Conditions leading to a blackout can occur slowly over several hours or very quickly.
- Separation won't fall along jurisdictional lines.
- Pockets of loads and generation (Islands) may stay online, but not be synchronized with the rest of the interconnection.

System Restoration Plan Objectives

- In a safe manner, restore generation and transmission service as quickly as possible with the following restoration process goals:
 - Predictable system behavior during the restoration process.
 - No damage to Plant, Transmission or Distribution Equipment.
 - No secondary failure of restored parts of the system
 - Re-establishment of the interconnected grid
 - Rapid, safe restoration of all load

Be Safe

What happens during a blackout?

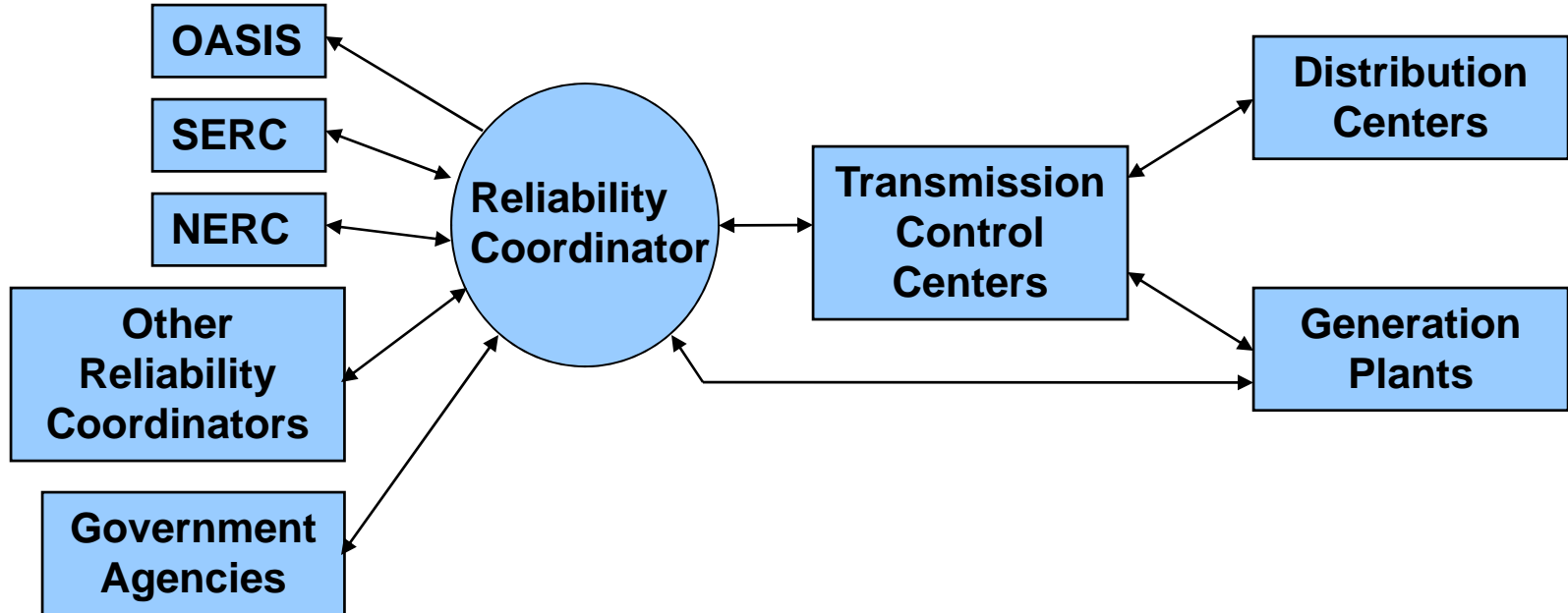
The Transmission Control Centers (TCC's) and the PCC will implement restoration plans and begin to:

- Establish communications and evaluate the extent of the outages.
 - Determine what is out and stabilize what remains intact.
 - Assess the status and availability of plants.
 - Coordinate with neighboring systems.

- Where possible, use stable portions of the interconnection to reconnect islands and outaged areas.

- Initiate procedures at black start plants to begin restoring blackout areas.

Communication Protocol



How to communicate with the Control Centers

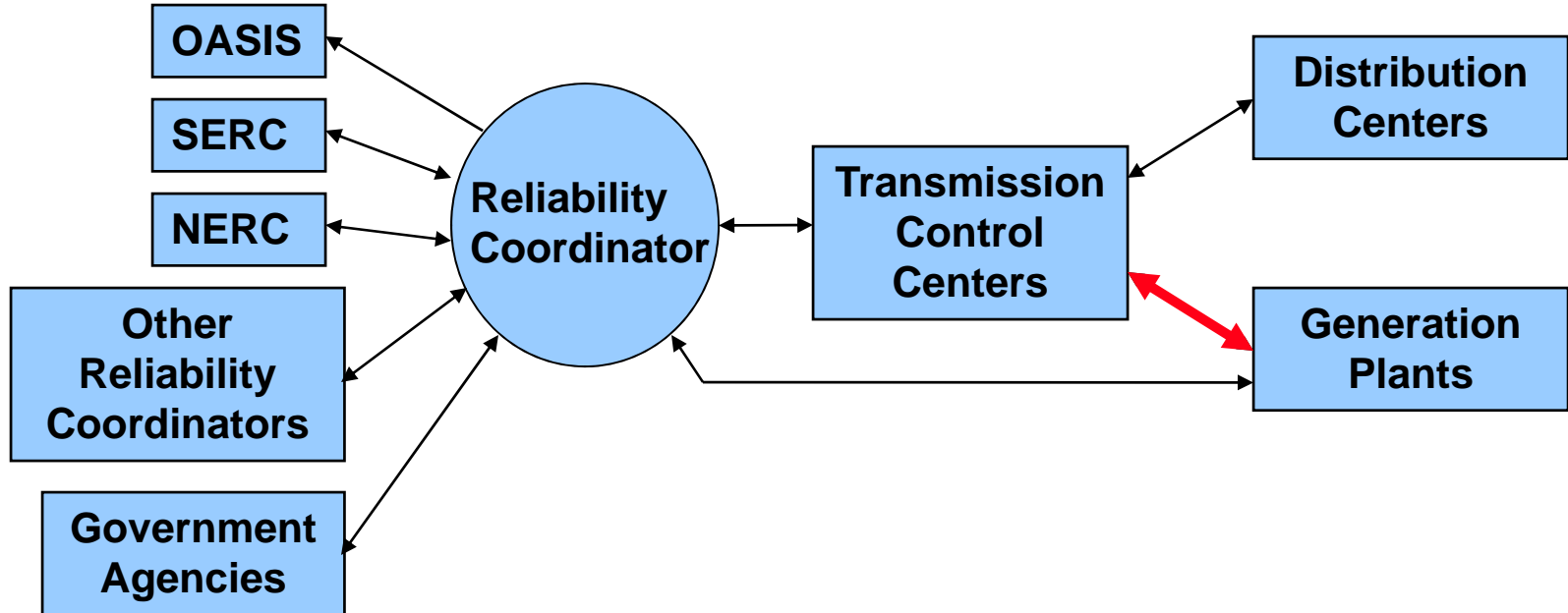
In advance

- Provide your operating committee with up-to-date contact information including any backup systems such as satellite or cellular.

During the event

- Continue to use normal communication equipment if available. Remember that telephone service may fail if there is an extended outage.
- Use the GenComm system (if operational) to communicate with the Control Centers.
- The Southeastern Subregion Reliability Coordinator and Southern Transmission Control Centers have several layers of backup communications. They may be able to establish contact through the backup information you provide.

Communication Protocol



In the event of blackout

Generator role during a blackout

If the plant is offline or knocked offline:

- Evaluate the plant for damage and take action needed to make the plant available for return to service.
- Report the condition of the plant to the TCC as soon as practical for coordination with the Reliability Coordinator.
- Work with the Transmission Control Centers to return the plant to service in order to balance load and generation. TCCs provide guidance as to which plants to start.

If the plant remains online,

- Stay online and operate the plant using constant frequency.
 - Automatically switch to constant frequency if you lose communications with the TCC.
- Contact the TCC for coordination with the Reliability Coordinator. Remain in constant frequency until contact is made and otherwise directed.
- Once communications are restored, the plant may be asked to continue using constant frequency operation in order to balance load and generation.

Do not bring units on line without direction from the TCC!

BE SAFE !!!!

Constant Frequency Operation

- Concept developed by NERC for use during Y2K.
- Provides a strategy for power plant operations in the case of a complete loss of communications between the power plants and system operators.
 - Can be utilized by a single plant, but is most effective when adopted across an entire interconnection.
- A copy of the Constant Frequency Operating Guide should have been provided to each plant.

Constant Frequency Operation

Eastern Interconnection Constant Frequency Operating Guide

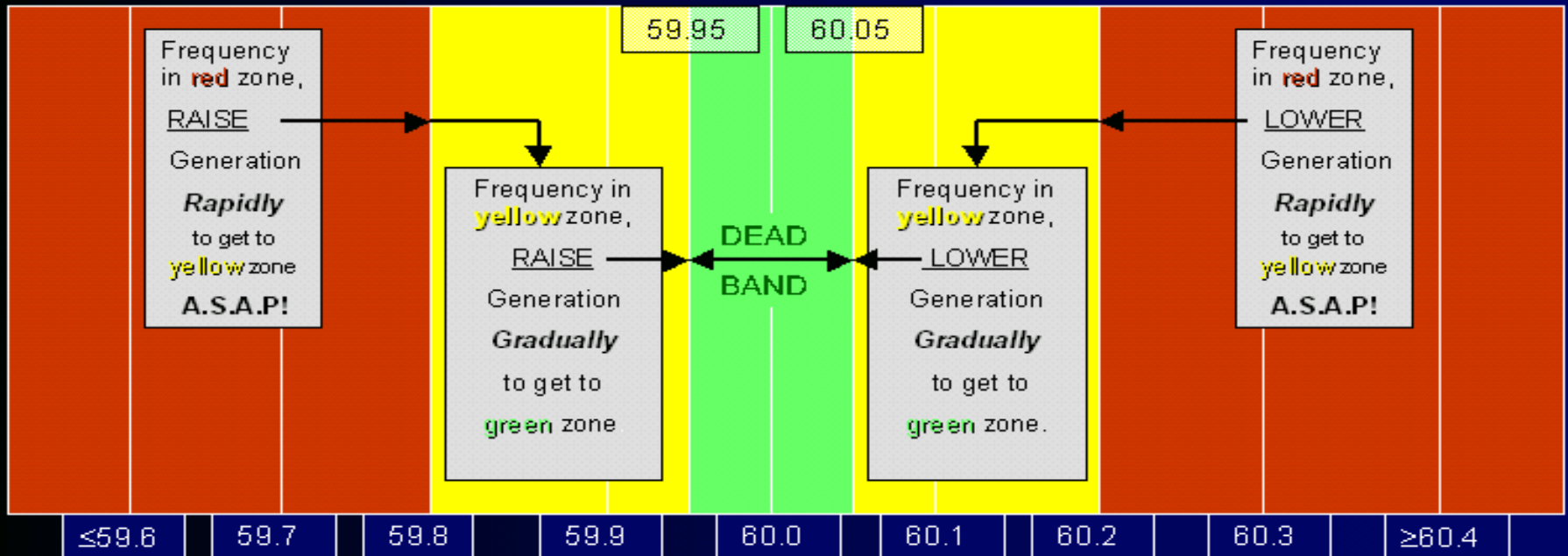
1. Use this guide **only** when AGC and all voice communications with System Control have been lost.
2. When frequency is in **green** zone, let governor action control unit output.
3. When frequency is in **yellow** zone, manually load/unload unit in gradual increments to avoid overcorrecting. **(note: Generally 1% of unit rating per minute)**
4. When frequency is in **red** zone, manually load/unload unit as quickly as possible.

Freq. (Hz)	Shaft Speed (RPM)		
	2-poles	4-poles	-poles
59.80	3588	1794.0	
59.90	3594	1797.0	
59.95	3597	1798.5	
60.00	3600	1800.0	
60.05	3603	1801.5	
60.10	3606	1803.0	
60.20	3612	1806.0	

Frequency = $\frac{1}{2}$ (no. of poles) x (RPM/60)

In situations of severe under/over speed or severe under/over voltage,

Take Standard Precautions To Protect Your Unit!



Market Implications During a Blackout

Depending upon the extent of the blackout:

- Some market services may be temporarily unavailable.
- Updates will be posted on OASIS if available and updates provided through the TCCs.
- To the extent disrupted, market services will be reinstated as grid conditions stabilize.

2010 SERC Reliability Corporation Blackout Restoration Exercise

Conducted yearly for:

- Educating fundamentals of blackout restoration
- Testing coordination among all entities
- Testing communications capabilities
- Improving operation skills to determine blackout area and its restoration
- Testing new coordination tools

2010 SERC Reliability Corporation Blackout Restoration Exercise

2010 Exercise

- November 3 and 4
- Entergy Headquarters Jackson, Mississippi
- OES - NA Facilitating
- Coordinate attendance with Margaret Stambach of SERC

Questions ?