

# ***Set-Top Box Power Management Considerations***

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## ***Set-Top Energy Management and Reduction is an Issue of Great Importance to Service***

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- **Reducing energy consumption is a national priority**
  - **Cable Service Providers have embraced this energy saving initiative**
  - **Comcast has been meeting ENERGY STAR® requirements for set-top hardware deployments since 2008**
    - **Nearly 100% of Set-Top devices purchased in 2011 by Comcast were ENERGY STAR® devices**
  - **Electric Utilities are committed to reducing overall energy consumption by encouraging conservation measures by their customers**
    - **Set-Top boxes and their operating profile have received a great deal of attention for several years**
      - **Set-Top boxes draw varying amounts of power even when they are not delivering content to a viewer**
      - **Some older designs consumed the same amount of energy 24/7**



## ***A Number of Measures Have Been Advanced to Improve Set-Top Energy Efficiency***

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- **Over the years, Cable Operators working with silicon and hardware manufacturers have reduced energy consumption of Set Top Boxes**
- **The ENERGY STAR® program has been active for the last several years defining set-top efficiency goals and encouraging participation by Service Providers**
- **There have been some ad hoc efforts on the part of utility companies, advising their customers to unplug their devices when they are not using them, connect them to “smart power strips”, or switched power strips to fully power off a set-top box**
  - **Unfortunately, this can create some issues**

## ***“Set-Top” boxes are complex computing devices.***

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- **Set-Top boxes are expected to seamlessly perform a number of complex computing operations**
  - **All Set-Top boxes act as an interface from the Cable Service Provider’s network to deliver video and audio to the subscriber’s viewing device.**
  - **Conditional Access (signal security) must be decoded**
  - **Program Guide information must be kept up to date**
  - **Subscriber scheduled instructions for recordings must be retained**
  - **Software occasionally needs to be updated**
  - **Computers and computing equipment are not designed to have their primary power frequently interrupted**

# ***Powering Down a Set-Top Box is Not a Desirable option for Energy Reduction***

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- **Program Guide Data is stored in *volatile* memory and must be updated on a regular basis. Following a power interruption it may take several hours to repopulate a full program schedule**
- **A DVR will have very little value if primary power is frequently removed**
  - **Recordings in DVR boxes can be lost if the box is powered off when a recording is in progress**
  - **Scheduled recording information will be lost and the DVR cannot wake up to record a selected program when power is lost**
  - **As noted above; It may take a number of hours for enough guide information to be restored to set up a scheduled recording on a DVR that has lost power**
  - **A number of Service Providers are offering the ability to schedule recordings remotely from a smart phone or internet device. A powered off DVR cannot respond**
- **Set-Top boxes require new software from time to time**
  - **Upgrade user functionality and features**
  - **Repair software bugs that are discovered.**
  - **Upgrades are usually done during non-viewing time as some boxes may take as long as an hour to upgrade and return to normal service**

## ***Powering Down a Set-Top Box is Not a Desirable option for Energy Reduction, Cont'd***

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- **Authorization and security problems can develop if set-tops are frequently powered off. Set-Top box security systems transmit authorization keys on a regular basis. A set-top that misses authorization updates for prolonged periods may be removed by the network server. That set-top will require the subscriber to call the cable operator to request a reauthorization of their box**
- **Set-top boxes that are powered off create false network trouble reports and Impair network performance monitoring**
  - **A set-top that fails to respond to repeated network monitoring inquiries could be viewed as a defective device**
  - **Cable operators often use the status reporting of set-top boxes as a measure of the overall network status.**
  - **Non-responding set-top boxes , especially if a number are located in a common area can be interpreted as damage to the network causing the operator to roll a truck to that location to check on the trouble. That technician is not available to repair real problems and his travel consumes energy**
- **Shutting off power to other devices in the home can be hazardous. Cutting power to internet modems can disconnect cable or VOIP phone service. This can prevent the subscriber from making or receiving emergency phone calls**

## ***There are Promising Methods to Create More Efficient Set-tops***

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- **Set-top energy efficiency improvements are important to Cable Operators. Cable operators are working with industry partners to achieve greater efficiencies**
  - **Silicon Architectures are becoming more compact. These dense architectures consume less power for the same task**
  - **More efficient circuit designs such as improved switching power supply circuitry reduce power consumption**
  - **Design of the set-top system on a chip (SOC) that permit reducing voltage or shutting off sections the SOC that are not needed to reduce power consumption**
  - **Shutting off or reducing the speed of a disc drive on a DVR box when the drive is not in use saves significant energy**
  - **Sleep (reduced power when not in use) states will form a base for energy reduction without impairing the set-top subscriber interface**
- **Hardware and software development will take some time but it will be instrumental in managing energy reduction in set-top boxes.**