

# Telecom Networks

**GOING GREEN  
...SINCE HALF A CENTURY!**

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# Primary R & D Goals

- *Providing a better solution*
- *Application of new knowledge*
- *Exceeding the state-of-art*
- *Beating the competition*
- *Chasing High Efficiency*
- *User friendly packaging & easy maintainability*

# Why chase higher efficiency?

- *Improved reliability -low heat loss*
- *Growingly compact system – portability*
- *Higher Intelligence Content –less hardware – Software Signal Processing*
- *Reduced consumption of material resources and weight*

# Powering Green Telecom

- *Independence from the National Grid*
- *Use of Solar and wind are local energy sources – Input free*
- *Energy storage – current limitation*
- *Super capacitors to store solar power*

# ESP – Embedded Solar Panel

- *Constant Peak Power Constant voltage source*
- *Applicable to all current Photo Voltaic Panels – mono/ poly crystalline & Film*
- *N+1 parallel option –flexible add-on for power enhancement*
- *Each an independent source of free power*

# Features of ESP - 1

*Embedded Solar Panel, ESP, has embedded in it a combination of Maximum Peak Power Tracking, MPPT, to extract maximum available power from a solar panel using a DSP controller and a DC to DC boost converter to efficiently deliver this peak power at constant voltage*

# Benefits of ESP - 1

- *This makes any PV Panel to serve as a directly usable Constant Voltage DC source while harvesting maximum solar energy from the panel under any solar condition.*
- *ESP enables the use of solar energy extremely easy for any consumer; making her/ him free from technical hassles.*

# Benefits of ESP – 1

(Continued)

- *ESP makes using solar power as easy as “procure, spread under the Sun and use”*
- *ESP Battery Chargers are ideal for use in field telecom networks & in EV automobile sectors as standard stock items like a storage battery*

# ESPs for Telecom

- *220 -250Wp ESP (of 1m x 1.6m size) delivers peak solar power at a constant voltage of 54.4V DC to charge and keep the battery on float while feeding load*
- *Every ESP added in parallel adds its own power to the parallel array*
- *One can connect  $N+1$  ESPs in parallel to get the desired power*
- *Each 250Wp panels gives about 1kWh of energy on a sunny day*

# Features of ESP - II

The embedded controller converts any Photo Voltaic solar panel; mono-crystalline, poly-crystalline or film type Photovoltaic Panel, of any cell efficiency and with any  $V_p$  or  $W_p$  rating into a panel with identical output that can work in parallel with one or several ESPs.

# Benefits of ESP - II

- *This feature allows designer to use PV Panel with any technology and any characteristics in a parallel array for high power*
- *This eliminates need for matching and batching hundreds of panels and makes array design independent of PV panel technology and characteristics. This reduces both, cost and*

# Features of ESP - III

*High Voltage ESPs help delivery of Constant Peak Energy at any voltage output up to 300VDC*

# Benefits of ESP - III

- *This eliminates the need for connecting several PV panels with low DC voltage in a series string to build up high voltage necessary for its efficient use in an array.*
- *It also eliminates the problem of high voltage swings that one encounters in arrays built with series connected normal PV panels with changing solar*

# Benefits of ESP III

(continued)

- *It delivers PV panel output power at low current; thus avoiding transmission power loss or reduce cost in cabling*

# Features of ESP - IV

## *Enables all Parallel Architecture:*

*ESP's Mitramax Technology, that converts any solar panel to have identical electrical characteristics at high DC voltage, enables system designers to form an efficient array using totally parallel architecture.*

# Benefits of ESP - IV

*It is here that the shade-tolerant characteristics of the parallel array of ESPs come into their own; the ESP array has a multitude of panels in parallel feeding a single bus bar. This avoids dramatic loss in the power output of presently used conventional arrays due to*

# Benefits of ESP – IV

(continued)

- *Shadow on one ESP in parallel architecture just affects the power contributed by that particular panel. In an array of hundreds of panels, this is a minor loss even if one or two are in shadow or dirt covered.*
- *There are considerable energy gains in parallel architecture since the incident solar energy can vary widely over the large array fields*

# Features of ESP - V

- ESPs essentially provide from the Sun constant peak power over a range of high voltage meaning thereby that they have self adjusting output voltage but at any of these voltage it delivers its peak power.
- **They adjust their output current to keep output power constant at  $W_p$**

# Benefits of ESP - V

- *This allows ESPs to work in series to give still higher voltages such as 600V or more while each delivering its peak power .*
- *They maintain load voltage constant while self-adjusting their voltage and power contribution caused for any*

**Thank You**  
**For your interest**  
**and attention!**