
SuperPower FM
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Photographer: Dickenson V. Alley

Agenda

- FM Power levels around the world
- Why SuperPower FM?
- Competitive products
- The *new* GV60 and GV80
- Planning for a SuperPower FM
  - AC considerations
  - Feedline
  - Options
- Your questions

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Director of Sales

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SuperPower FM around the world

There are more than 450 FM stations worldwide with licensed ERP of greater than 100 kW.

They range up to 400 kW, and are distributed all over the world.

Depending on antenna gain and feedline losses, transmitter power is likely to be greater than 40 kW.

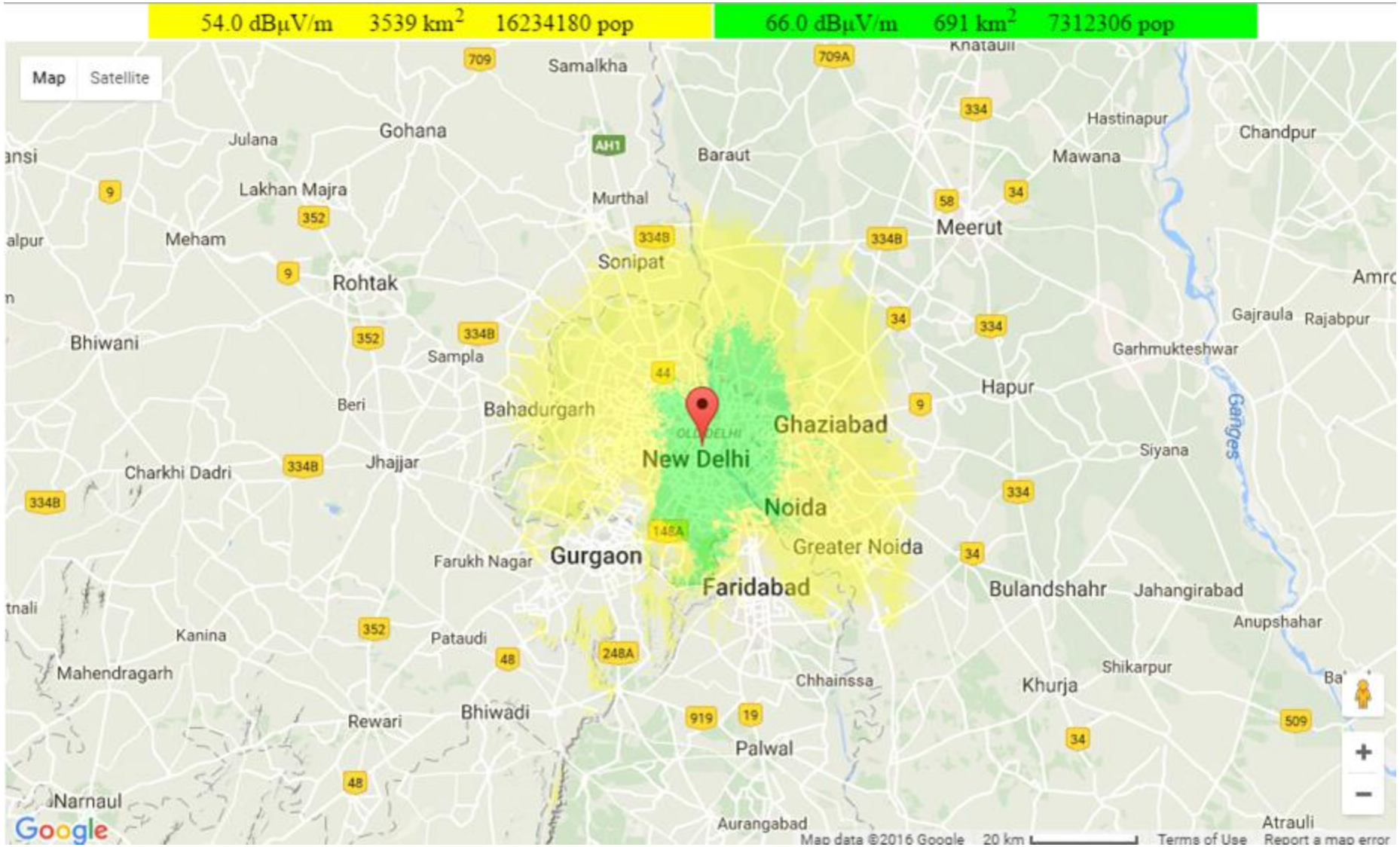
Why High Power FM?

There are several strategies for FM design:

- Cellular approach: many lower power FM stations, all on different frequencies. With or without SFN.
- Hub and filler approach – one high power central transmitter in the major city, with lower power transmitters on different frequencies filling in the gaps and extending coverage. With or without SFN.

An example: 2.5 kW 4 bay CP antenna at 100 M

You can do this analysis yourself, free, with Nautel's RF Toolkit !



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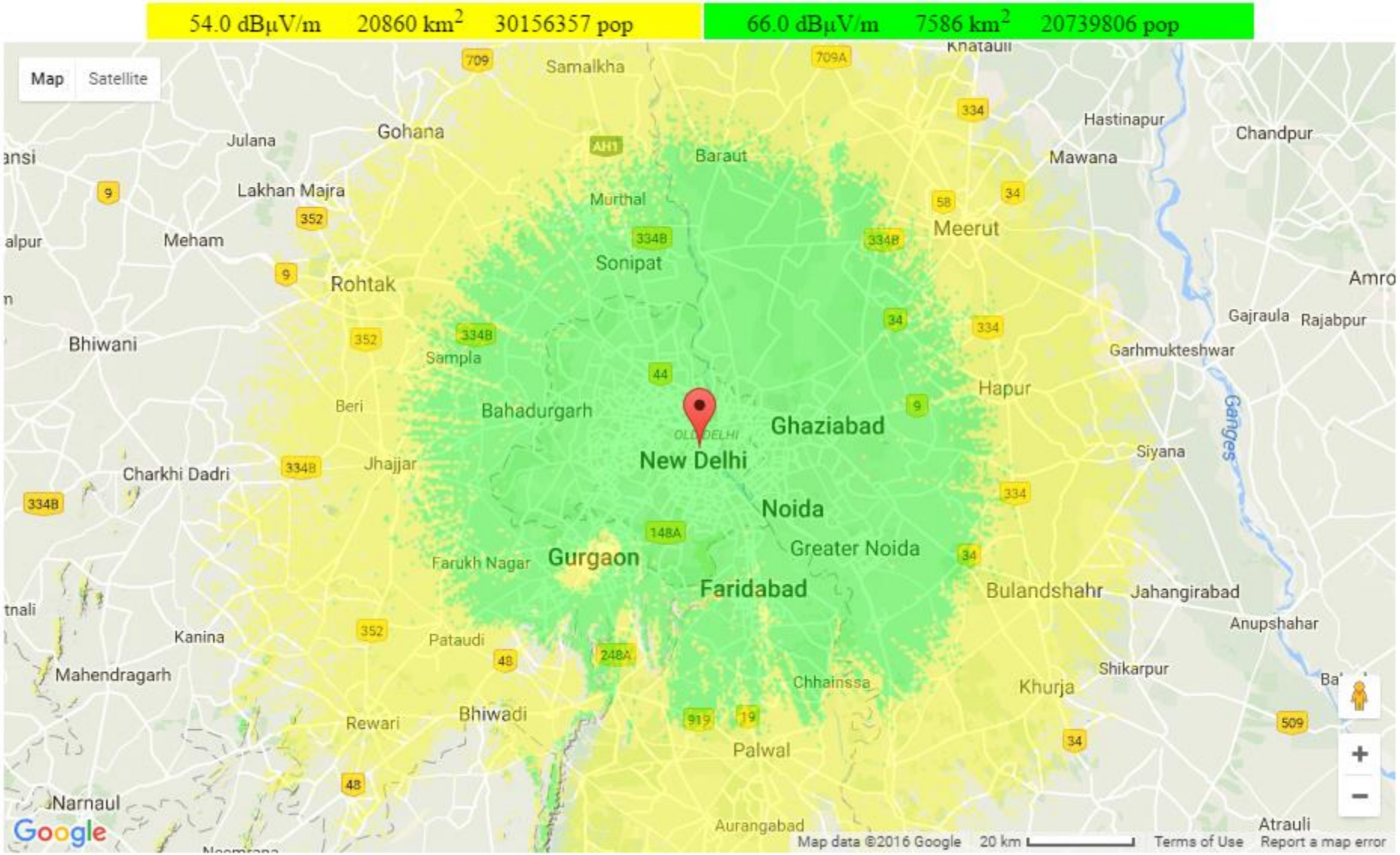
40 kW to 10 bay CP at 100 M:

Nearly 11x the city grade area coverage

Nearly 3x the city grade population



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Doing the math

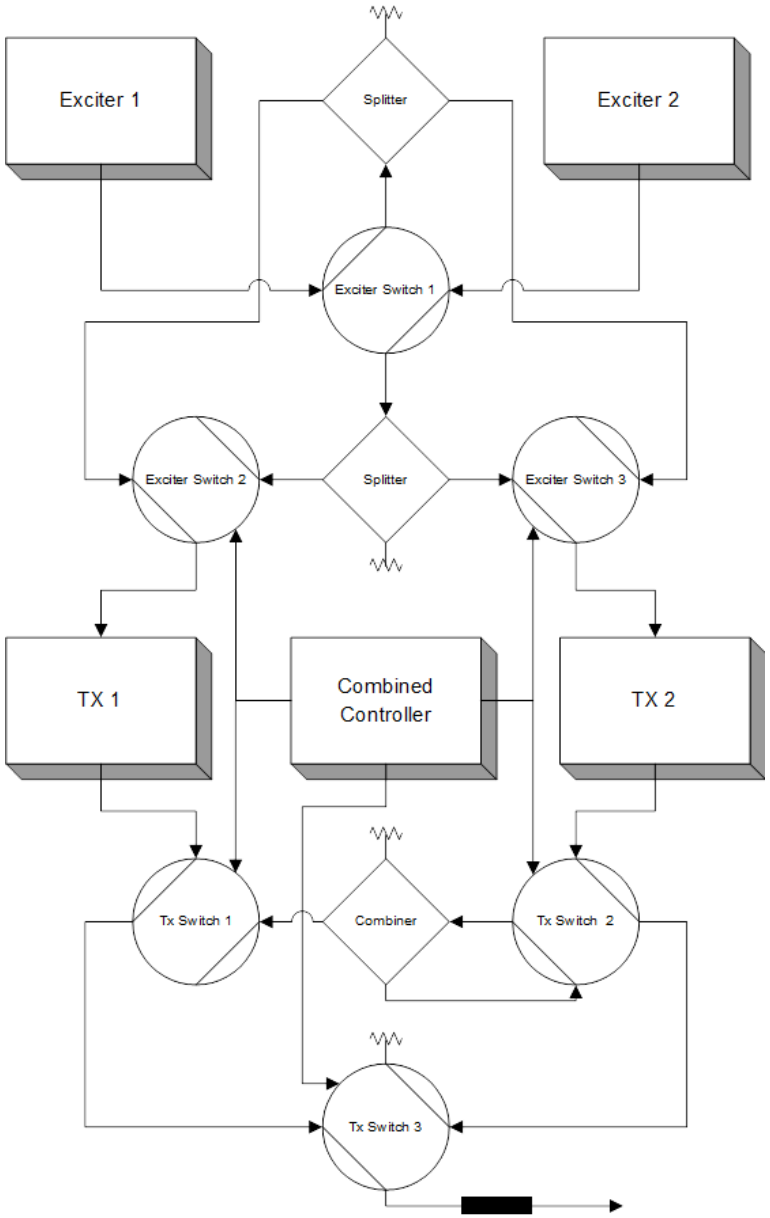
Average costs for the transmitter, antenna, and feedline of the 2.5 kW system is about US$30,000, which is about US$0.0041 per person covered in the 54 dBuV contour, while the 40 kW system might cost about US$150,000 or about US$0.005 per person covered in the 54 dBuV contour. Pretty similar – but consider what is not included, site acquisition costs for the low power sites:

- Tower
- Transmitter building, power, cooling
- STL's, etc.

Given typical site costs, high power FM is generally less expensive.

So what is available in FM transmitters above 40 kW?

- Most high power installations to date have used:
  - Combined FM tube transmitters of 35 to 50 kW
  - Combined FM Solid State transmitters
  - Customized analog Television transmitters
- When you combine transmitters you need to:
  - Synchronize the power level and phase of both transmitters
  - Raise the power of the transmitters with the power balanced to avoid putting power into the reject load.
- If a transmitter fails – you're at 25% of full power unless you can switch around the combiner.



Introducing the new GV60 and GV80:

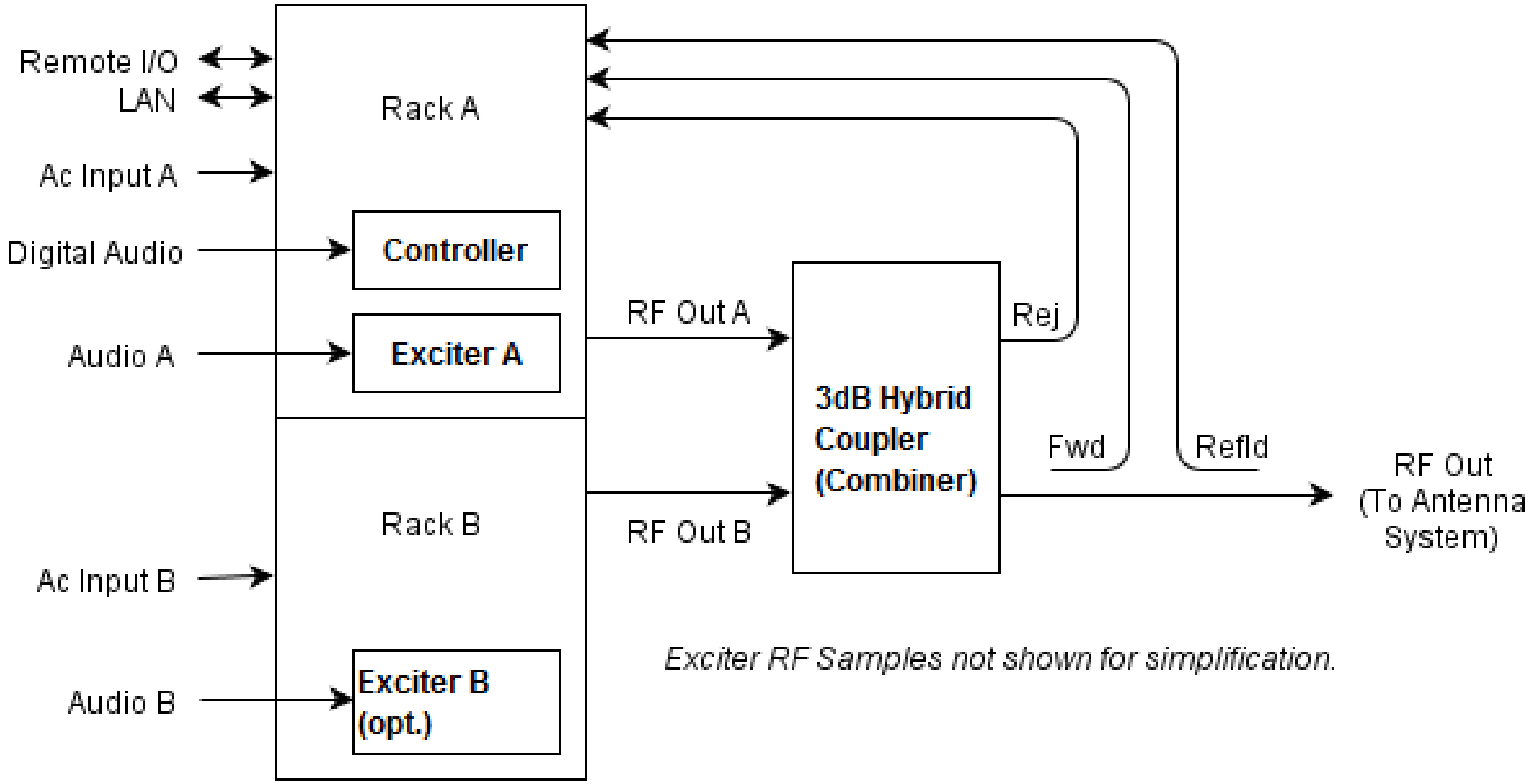
- Configured as a *single* solid state transmitter:
  - A single controller – no manual balancing required
  - Designed as fault tolerant
  - No external switching needed

Model	1 PA Failed		2 PA Failed		3 PA Failed		4 PA Failed		1 PS Failed		2 PS Failed		1 RF Module Failed		2 RF Module Failed	
	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case
GV60	98%	98%	96%	64% *	94%	63% *	92%	61% *	96%	96%	92%	92%	92%	92%	84%	42% *
GV80	98%	98%	97%	65% *	95%	64% *	94%	63% *	97%	97%	94%	94%	94%	94%	88%	44%

Designed for redundancy and reliability:

- Standard Redundant LVPS
- Integrated local backup user interface
- Parallel RF power amplifiers
- Conservatively rated power supplies
- Optional UPS Interface available
- Dual RF output exciter
- Multiple module control/interface boards

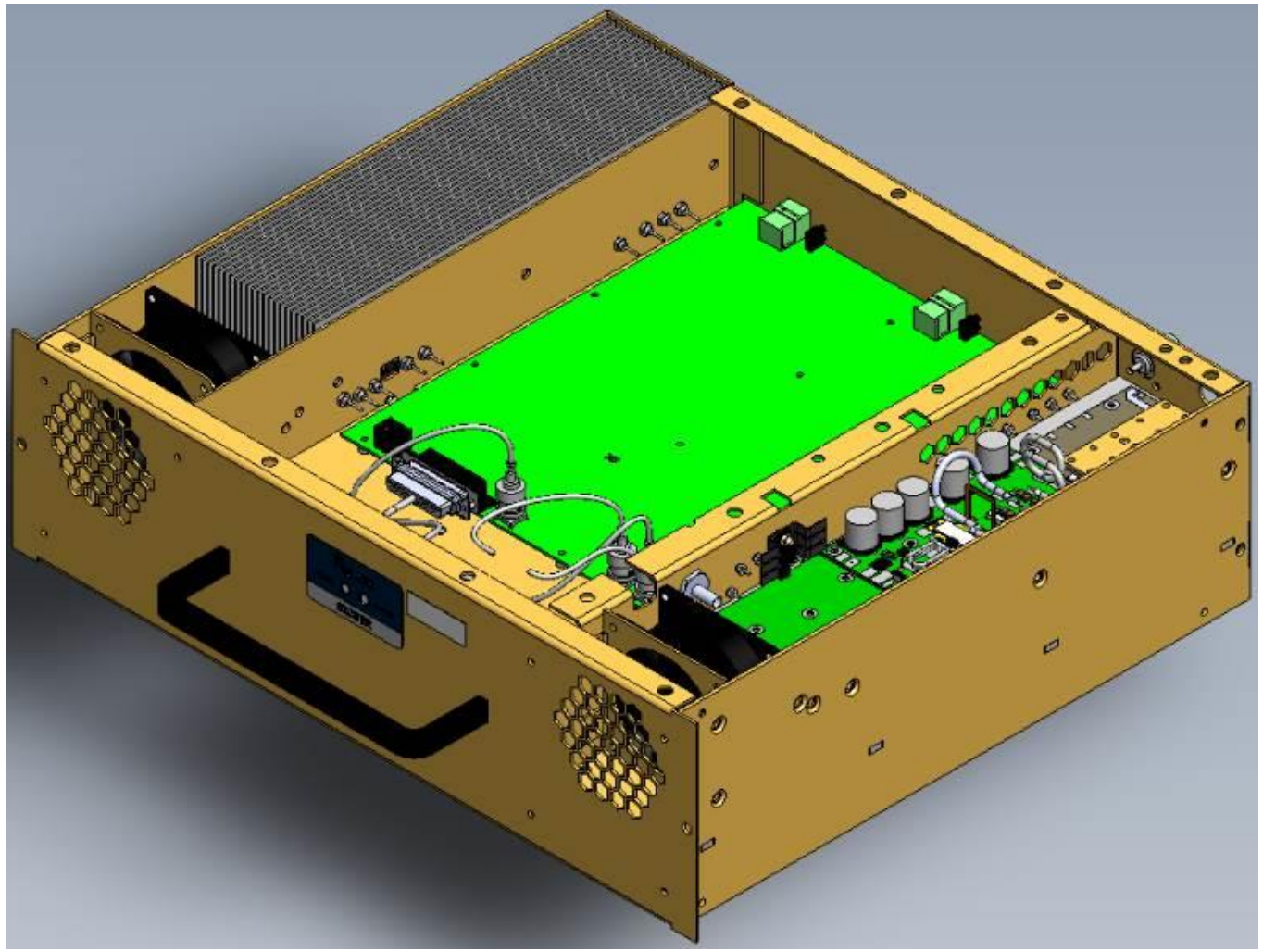
Block Diagram – GV60/GV80



New dual output, high power exciter – no IPA

Supplies over 1 kW for GV80, over 800 W for GV60.

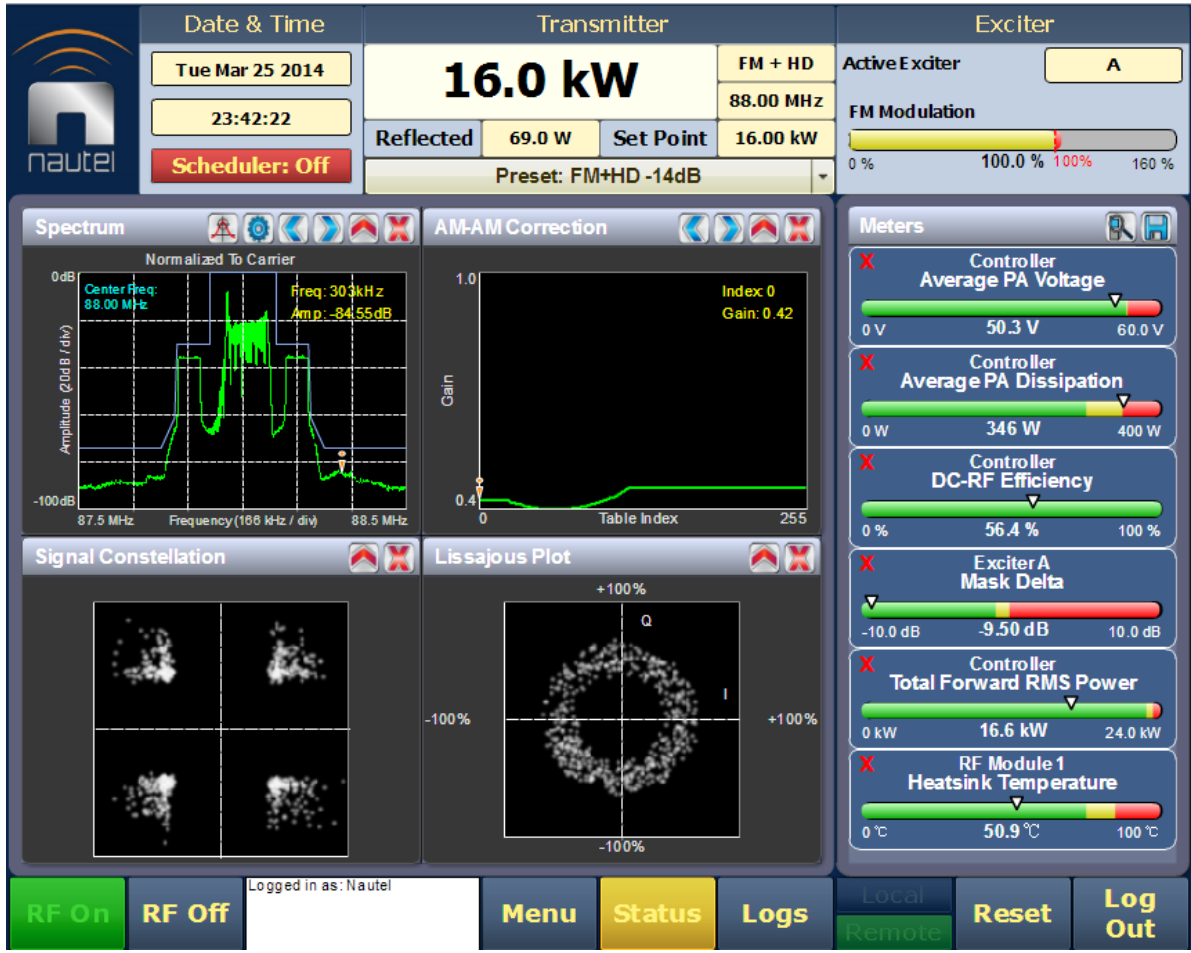
If spare exciter is purchased, they will operate in automatic hot standby configuration.



GV SERIES		GV60	GV80
Analog Only	Max Power	66 kW	88 kW
	Typical Efficiency	72%	72%
FM + HD -20dB	Total Avg Power MP1[1]	62.1 kW	82.8 kW
	Analog Power MP1[1]	61.5 kW	82.0 kW
	Analog Power MP3[1]	60.0 kW	80.0 kW
	Typical Efficiency	70%	70%
FM + HD -14dB	Total Avg Power MP1[1]	57.7 kW	77.0 kW
	Analog Power MP1[1]	55.5 kW	74.0 kW
	Analog Power MP3[1]	54.0 kW	72.0 kW
	Typical Efficiency	60%	60%
FM + HD -10dB	Total Avg Power MP1[1]	44.6 kW	59.4 kW
	Analog Power MP1[1]	40.5 kW	54.0 kW
	Analog Power MP3[1]	40.0 kW	52.0 kW
	Typical Efficiency	55%	55%
HD Only -20dB	Max Power MP3[1]	33.0 kW	44.0 kW
	Typical Efficiency	56%	56%
HD Only -14dB	Max Power MP3[1]	27.0 kW	36.0 kW
	Typical Efficiency	54%	54%
HD Only -10dB	Max Power MP3[1]	24.0 kW	32.0 kW
	Typical Efficiency	52%	52%
AC Input		1-Ph 175-265 V or 3-Ph 175-265 V / 303-459 V (47-66 Hz)[2]	
Power Modules		24	32
Switching Power Supplies		48	64
Power Factor		0.98 (unity power factor corrected)	
Height (in/cm)		98.7 (251)	107.4 (272.8)
Height (in/cm) (transmitter cabinet only)		72.5 (184.2)	
Width (in/cm)		102 (259)	132 (335)
Depth (in/cm)		33 (83.8)[3]	
Weight (in/cm)		2600 (1182)	3420 (1555)

With all the bells and whistles

- Spectrum Efficiency Optimizer
- 72% analog AC-RF efficiency
- Backup controller user interface
- New site control functionality via AUI
- Low mains operation >90 V (at 1/3 TPO)
- New dynamic RDS scrolling
- Spectrum Analyzer / Constellation view
- MPX over AES
- Industry leading Nautel AUI



Planning for SuperPower FM

- Site Layout
- AC Planning
- Reject Load
  - 25% of full power rating.
  - Only dissipates power if a failure occurs.
- Output connector
  - GV60 default 4-1/16”, optional 6-1/8” EIA
  - GV80 default 6-1/8” EIA

Options:

- HD Radio
- Orban Inside
- Second hot-standby exciter
- UPS interface
- Ability to separate racks for challenging site layouts
- Flexibility in the location of the combiner and/or reject load vs. transmitter

Nautel Support/Services

- **Support offices:**
  - Bangor, Halifax
- **Parts depots:**
  - Bangor, Halifax, Memphis
  - Memphis quick-ship depot
    - Order by 7:30 PM (Atlantic) for overnight delivery in USA
- **24/7 live support**
- **Live chat (business hours)**

- **Commitment**
  - Support for every Nautel product ever made, no matter when it was manufactured.

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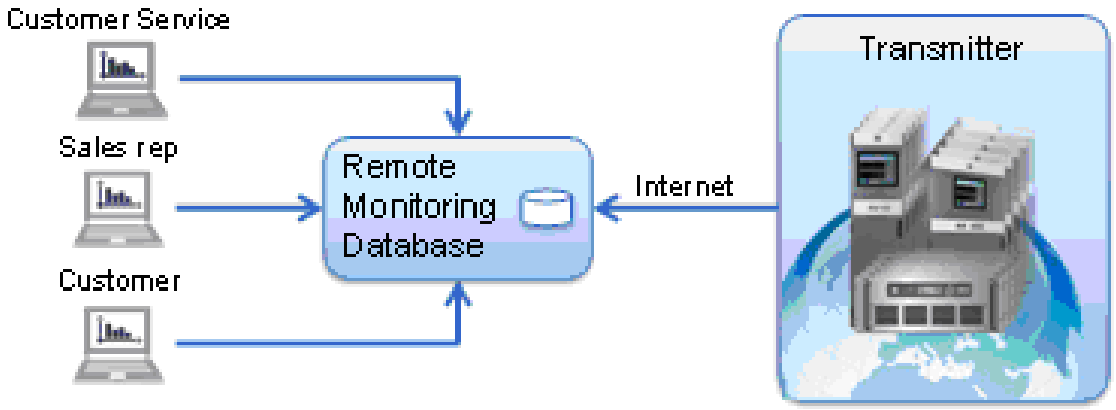

Global Transmitter Monitoring Solution

- Real-time information for faster resolution
- Firewall-friendly, permission-based access

2012 PICK HIT Radio

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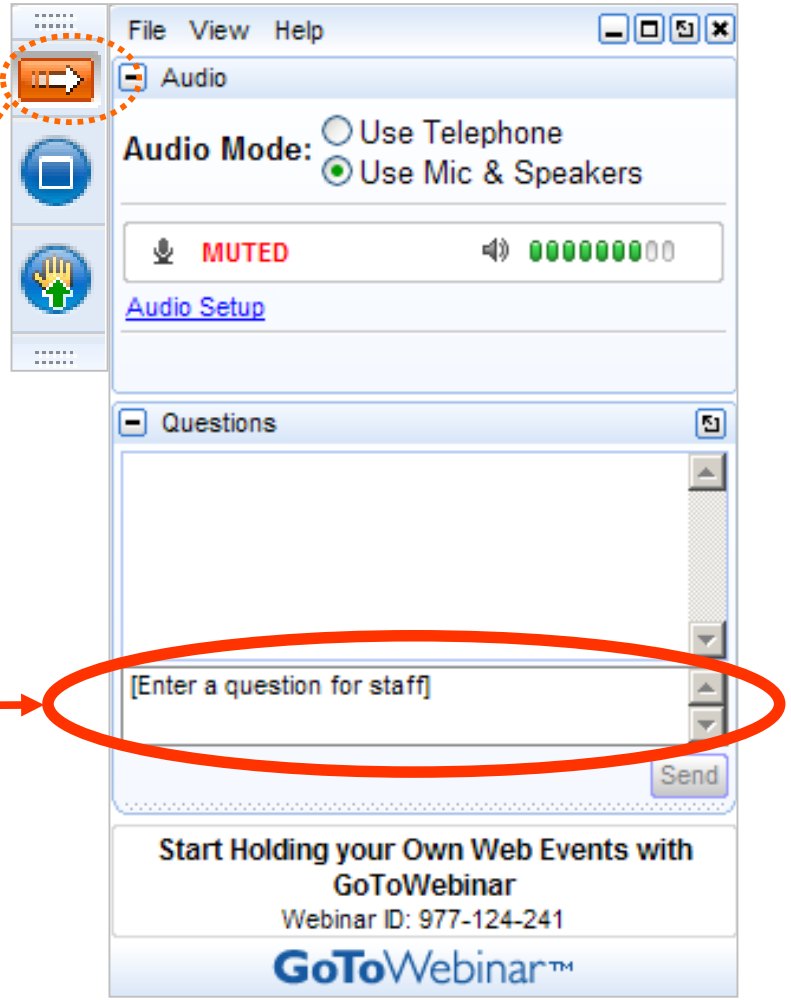
SuperPower FM Summary:

- SuperPower FM is often the most spectrally efficient and cost effective approach.
- Nautel's new GV60 and GV80 extend the range of the feature packed and industry performance leading GV series.
- The one-transmitter approach simplifies the system, and minimizes single point failure.

Questions?

Click on  *to open/close webinar panel*

Enter questions here …then press **Send**



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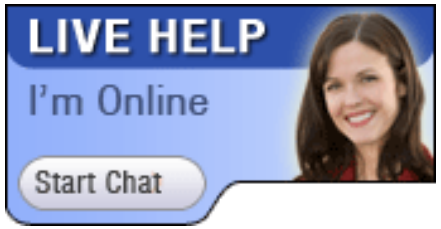

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