



Bird[®]

Public Safety Products

Agenda

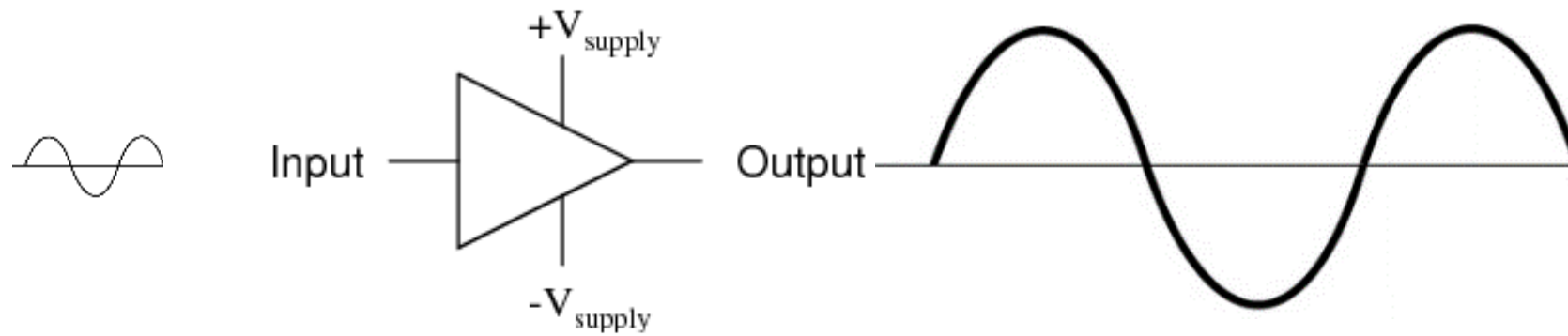
1. Boosters Introduction
2. SBII+ Broadband Booster Product Line
3. Fiber Fed SBII+ Expansion
4. SBIII Digital Booster Product Line
5. VHF Boosters and Specials
6. DAS Products
7. Q & A Panel Discussion

What is a Signal Booster?

- *A device that automatically receives, amplifies, and re-transmits on a bi- or uni-directional basis, the signals received from base, fixed, mobile, or portable stations, with **no change in frequency or authorized bandwidth.***



Signal Booster Basics



Signal Booster Basics

DONOR ANTENNA

DOWNLINK

FILTER

PRE-AMP

ATTEN

AMPS

FILTER

OLC

FILTER

AMPS

ATTEN

PRE-AMP

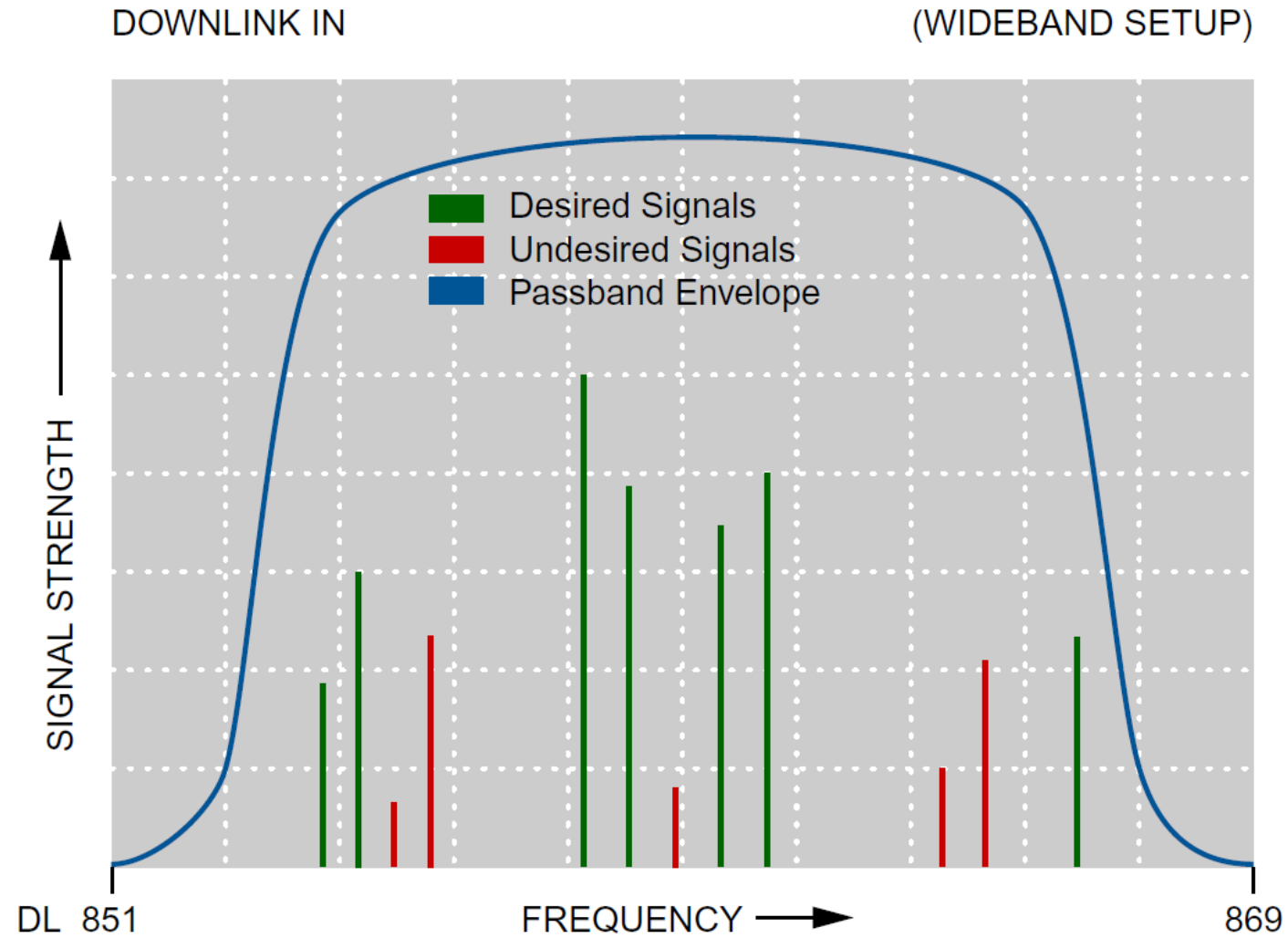
FILTER

UPLINK

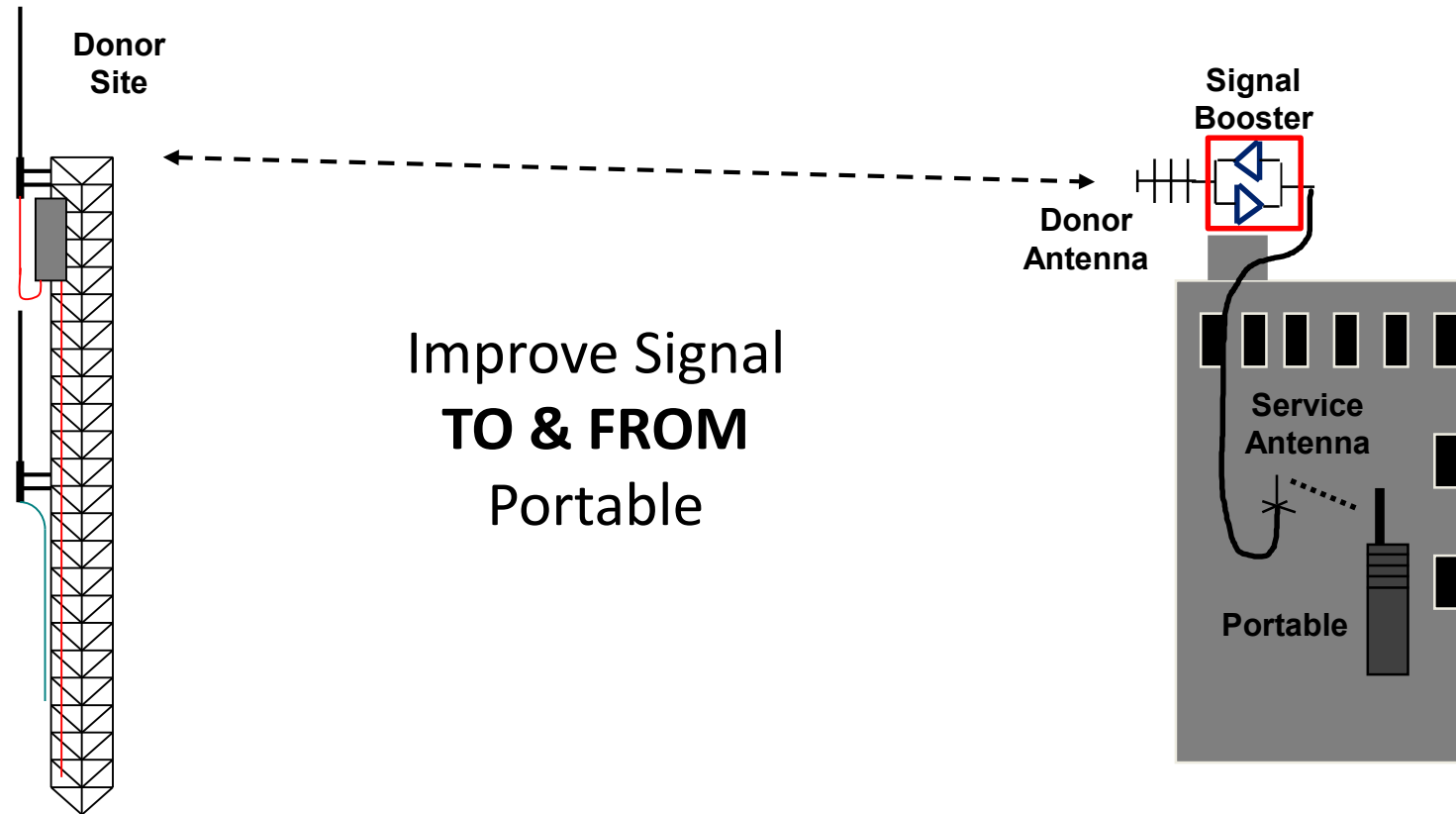
SERVICE ANTENNA(S)



Signal Booster Basics



Signal Booster Basics



SBII+ Introduction and Specifications



The SBII+ is available in the following Public Safety bands:

- UHF : 450-512 MHz
- 700 MHz : 763-806 MHz
- 800 MHz : 806-869 MHz

The SBII+ is based on “Modular Design”.

- This allows for not only several Standard configurations, but allows the ability to build Custom and unique configurations as well.

Two Standard Configurations:



Small

Clam Shell Type:

- Single Band 700 or 800 MHz



Large

Clam Shell Type:

- -UHF and
- Dual Band 700/800MHz

Signal Booster II+ Basic Specifications



STANDARD FEATURES

Ethernet - Local and Remote Access:

- An intuitive web browser user interface is used to configure the system locally and over the network.

SNMP

- The SBII+ incorporates the most secure SNMP version available today. Send system status trap messages to an SNMP Manager in the clear or Encrypted. Many SNMP configuration options available.

SMTP:

- Don't have an SNMP server? Send system status changes in an E-Mail to one or more E-Mail accounts.

Remote Firmware Update:

- If new firmware is ever needed, the SBII+ has the ability to update firmware from anywhere on the network.

Oscillation Detection and Management:

- Built in oscillation detection with multiple user configurable choices for managing the condition.

Filtering Options:

- Challenging RF application? No worries, filtering is included to support most RF Environments.

Output Level Control (OLC):

- Built in software capability to monitor and log OLC activity.

Programmable Gain Setting:

- Simply configure the gain setting through the browser interface from 35dB to 80dB.

At a Glance Status:

- Clearly visible External Multistate LED displays a different color to represent the system status state.

Multiple Power Configurations:

- Configure as AC primary, DC Primary or AC Primary with DC backup

National Fire Protection Association /International Fire Code Option:

- Includes all the alarms and battery backup configuration options to comply with the NFPA/IFC standards.

Fiber Options:

- Remote and Head-End fiber configurations available.

Custom Models:

- Have a special signal booster requirement? Bird has been building custom RF products for decades.

Warranty:

- Two Years



What type of Signal Booster do you need for you application?

The basic information needed to determine what type or model Booster is:

- Frequency required, provide a list of the desired system frequencies.
- Based on the required frequencies required, what is the passband bandwidth needed?
- Are multiple frequency bands or passbands needed?
- Does the booster need to be NFPA compliant?
- What type of housing is required?
 - NEMA 4 painted (grey, red, or other)
 - NEMA 4X Stainless Steel
 - Free-standing cabinet
 - 19" Rack Mountable

What Model SBII+ do I Need?



- Is a battery Backup unit required? If so, how many hours backup are needed?
- Is a Remote Alarm Monitor required?
- Are there any other requirement needed but not listed?
- If your requirement falls within the standard offerings, the model can be determined using the chart. For all other requirements, a custom configuration is needed, and you will need to contact the factory for assistance.



Nomenclature and Model Number



PRODUCT SELECTION GUIDE

Example: 63A-89C-2-A-G-2-N = Signal Booster II+, 806-861 MHz, 2-Way, 80 Gain, Bandwidth 3.0 MHz, Red NEMA 4 Case, NFPA

Note: Not all combinations are valid. If assistance is needed consult the factory to define the model that is right for you.

63A - - - - -							
Product Type	Band	Direction	Gain	Filter Bandwidth	NEMA 4 Enclosure		Options
63A	70	2 = 2-Way	A = 80	B = 0.5 MHz (450 to 470 MHz) D = 1.0 MHz (450 to 470 MHz) F = 2.0 MHz (450 to 470 MHz)	1 = Gray 2 = Red		N = NFPA
	69			B = 0.5 MHz (470 to 512 MHz) D = 1.0 MHz (470 to 512 MHz)			D = Dual Port
	82P			P = 12 MHz (DL: 763 to-775, UL: 793 to 805)			
	83B			P = 12 MHz (DL: 764 to 776, UL: 794 to 806)			
	89C			G = 3.0 MHz (UL: 806 to 809, DL 851 to 854) N = 10 MHz (UL: 806 to 816, DL 851 to 861)			
	89A			G = 3.0 MHz (UL: 806 to 809, DL 851 to 854) N = 10 MHz (UL: 806 to 816, DL 851 to 861) R = 18 MHz (UL: 806 to 824, DL 851 to 869) ¹			
	82R			PN = 12, 10 MHz (DL:763 to 775, UL: 793-805 & (UL: 806 to 816, DL 851 to 861)			
	83E			PN = 12, 10 MHz (DL: 764 to 776, UL:794 to 806 & UL: 806 to 816, DL 851 to 861) PR = 12, 18 MHz (DL: 764 to 776, UL:794 to 806 & UL: 806 to 824, DL 851 to 869) ¹			

SIGNAL BOOSTER UHF, 700, 800 MHz

SBII+ FIBER FED

| Cover 16x More Area

For advanced Public Safety grade coverage and amplification, the Fiber Fed SBII+ utilizes our superior optical transport to allow linking of up to 16 remote boosters to maximize coverage area. Designed for efficient system implementation with complete set-up, monitoring, and control from the head end. Several options are available making the system NFPA compliant, including the fiber fed alarm panel that displays the visual status of all alarms at one unit.



Wide Range of Models



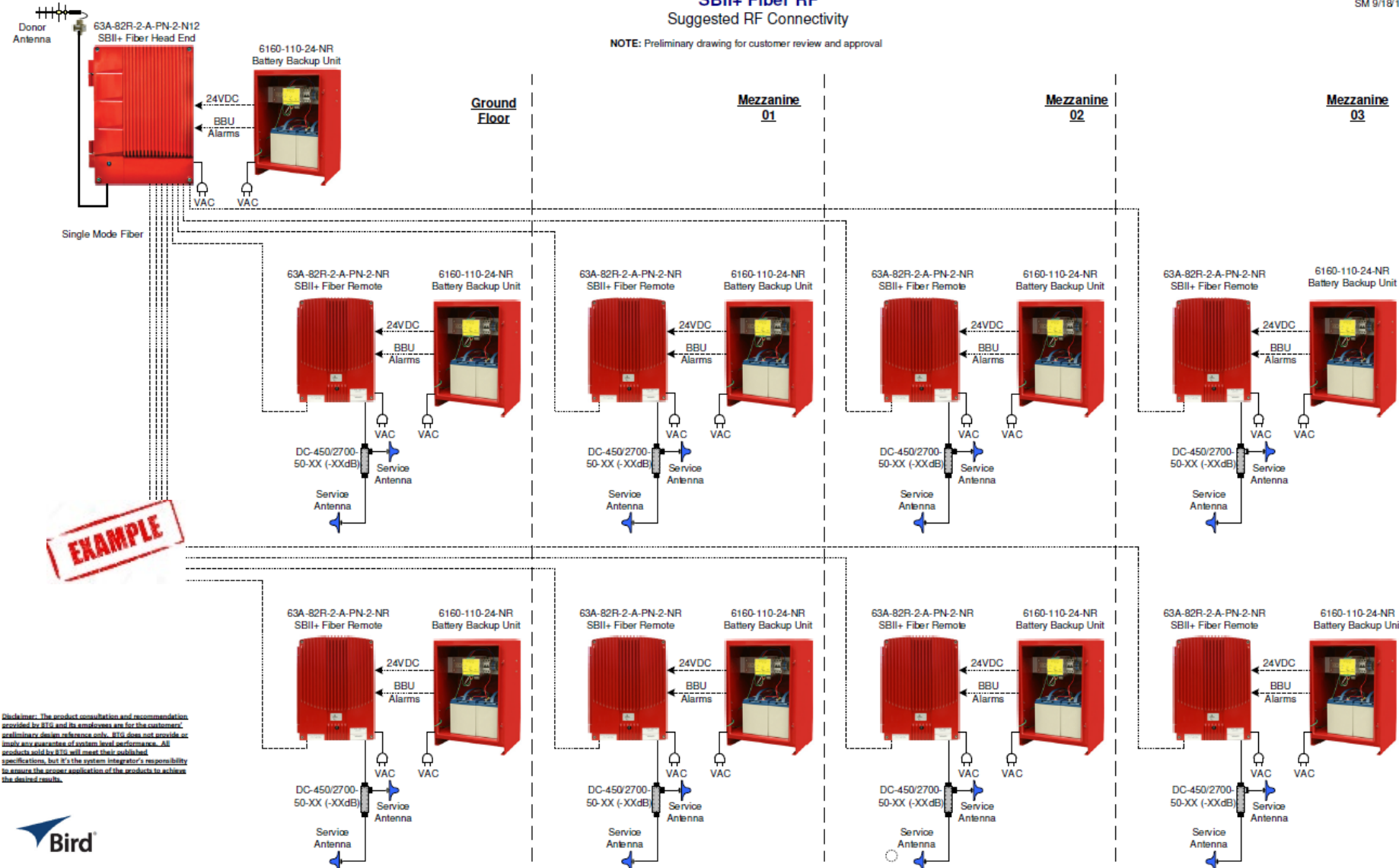
Product Type	Band	Direction	Gain	Filter Bandwidth	NEMA 4 Enclosure	NFPA Version
63A	70	2 = 2-Way	A = 80	B = 0.5 MHz (450 to 470 MHz) D = 1.0 MHz (450 to 470 MHz) F = 2.0 MHz (450 to 470 MHz)	2 = Red	N4 = 4 Port Fiber Head End N8 = 8 Port Fiber Head End N12 = 12 Port Fiber Head End N16 = 16 Port Fiber Head End NR = Fiber Remote
	69			B = 0.5 MHz (470 to 512 MHz) D = 1.0 MHz (470 to 512 MHz)		
	82P			P = 12 MHz (DL: 763 to 775, UL: 793 to 805)		
	83B			P = 12 MHz (DL: 764 to 776, UL: 794 to 806)		
	89C			G = 3.0 MHz (UL: 806 to 809, DL 851 to 854) N = 10 MHz (UL: 806 to 816, DL 851 to 861)		
	89A			G = 3.0 MHz (UL: 806 to 809, DL 851 to 854) N = 10 MHz (UL: 806 to 816, DL 851 to 861) R = 18 MHz (UL: 806 to 824, DL 851 to 869) ¹		
	82R			PG = 12, 3 MHz (DL: 763 to 775, UL: 793-805) & (UL: 806 to 809, DL 851 to 854) PN = 12, 10 MHz (DL: 763 to 775, UL: 793-805 & (UL: 806 to 816, DL 851 to 861)		
	83E			PG = 12, 3 MHz (DL: 764 to 776, UL: 794 to 806 & UL: 806 to 809, DL 851 to 854) PN = 12, 10 MHz (DL: 764 to 776, UL: 794 to 806 & UL: 806 to 816, DL 851 to 861) PR = 12, 18 MHz (DL: 764 to 776, UL: 794 to 806 & UL: 806 to 824, DL 851 to 869) ¹		

SBII+ Fiber Fed – General Overview

SBII+ Fiber RF Suggested RF Connectivity

SM 9/18/19

NOTE: Preliminary drawing for customer review and approval



Key advantages:

- 1. Reduced contribution to noise floor:** The most direct way to reduce the local noise floor is to reduce the number of transmitters. With a fiber fed system of boosters, only a single donor antenna is needed to support multiple buildings.
- 2. Simpler setup:** Complete control and configurability are orchestrated with any computer on an Ethernet network or virtually anywhere that Web access is available.
- 3. Ease of adding coverage:** Expanding an existing system to cover additional areas or buildings can be accomplished by adding remotes and running fiber to them or using existing fiber.

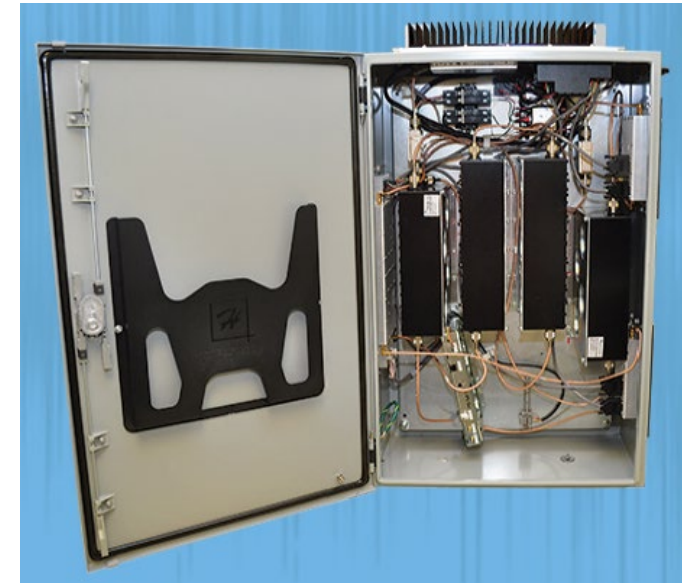


Product Features:

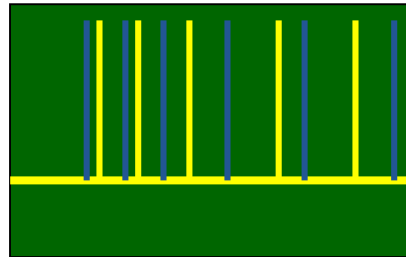
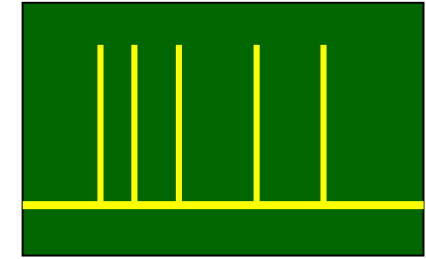
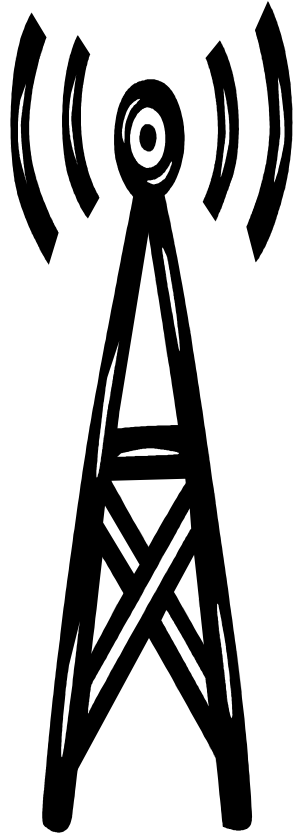
- Supports up to 16 Remote Boosters to maximize coverage area.
- The web browser user interface allows for local and network configuration.
- Multiple bands as needed.
- Complete set-up, monitoring, and control from the head-end.
- Highly secure SNMP to send encrypted or in the clear system status trap messages to an SNMP Manager.
- Easily perform remote firmware updates.
- Built in oscillation management and detection with multiple user configurable choices.
- On board LED displays and remote OLC monitoring capability.
- NFPA/IFC options includes all the alarms and battery backup configuration options to comply with the standards.
- Custom models available.



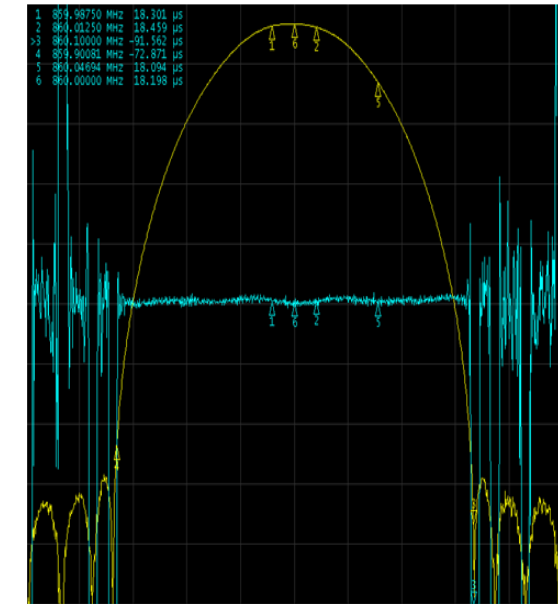
SBIII Introduction and Specifications



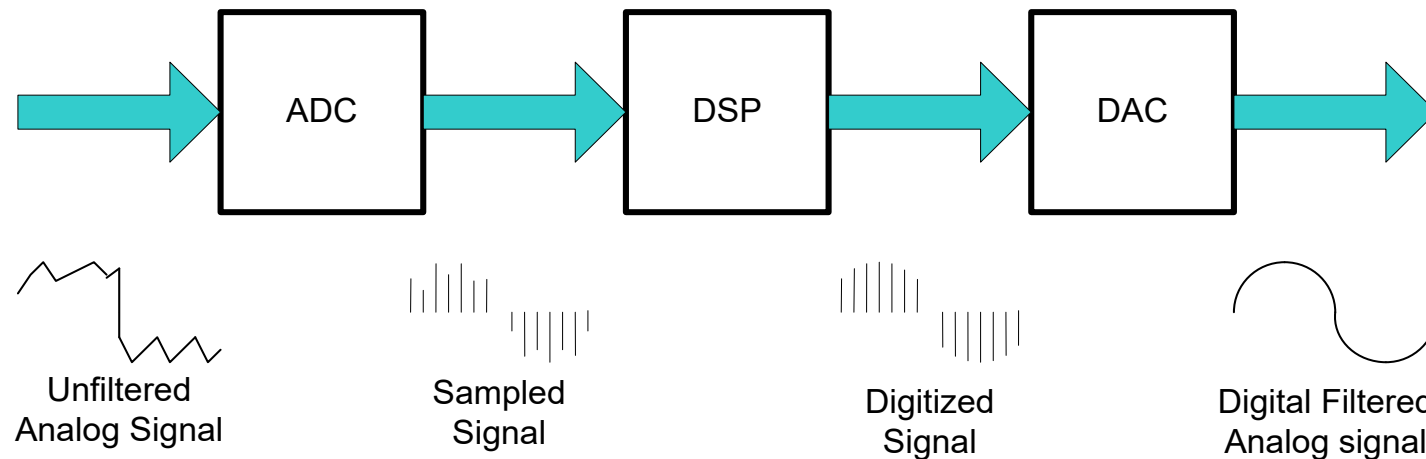
**By Using Digital Technology,
only the desired channels or
bands are amplified into the
building.**



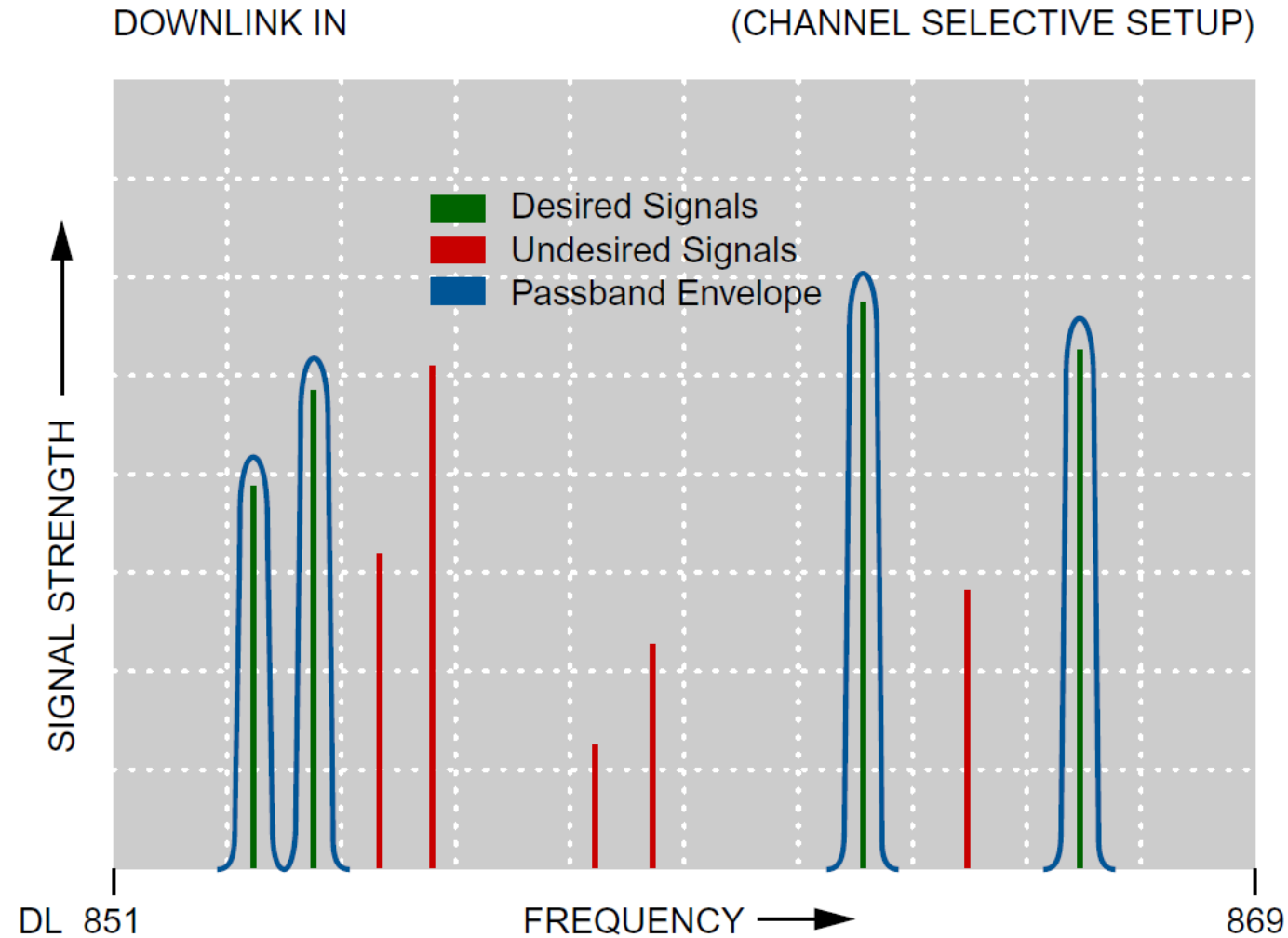
- **Digital Filtering:**
- By definition, a digital filter is a filter that utilizes a computational process, or algorithm, to transform one sequence of numbers into another sequence of numbers. This is typically accomplished via a Digital Signal Processor (DSP), which will perform calculations from a sampled value.

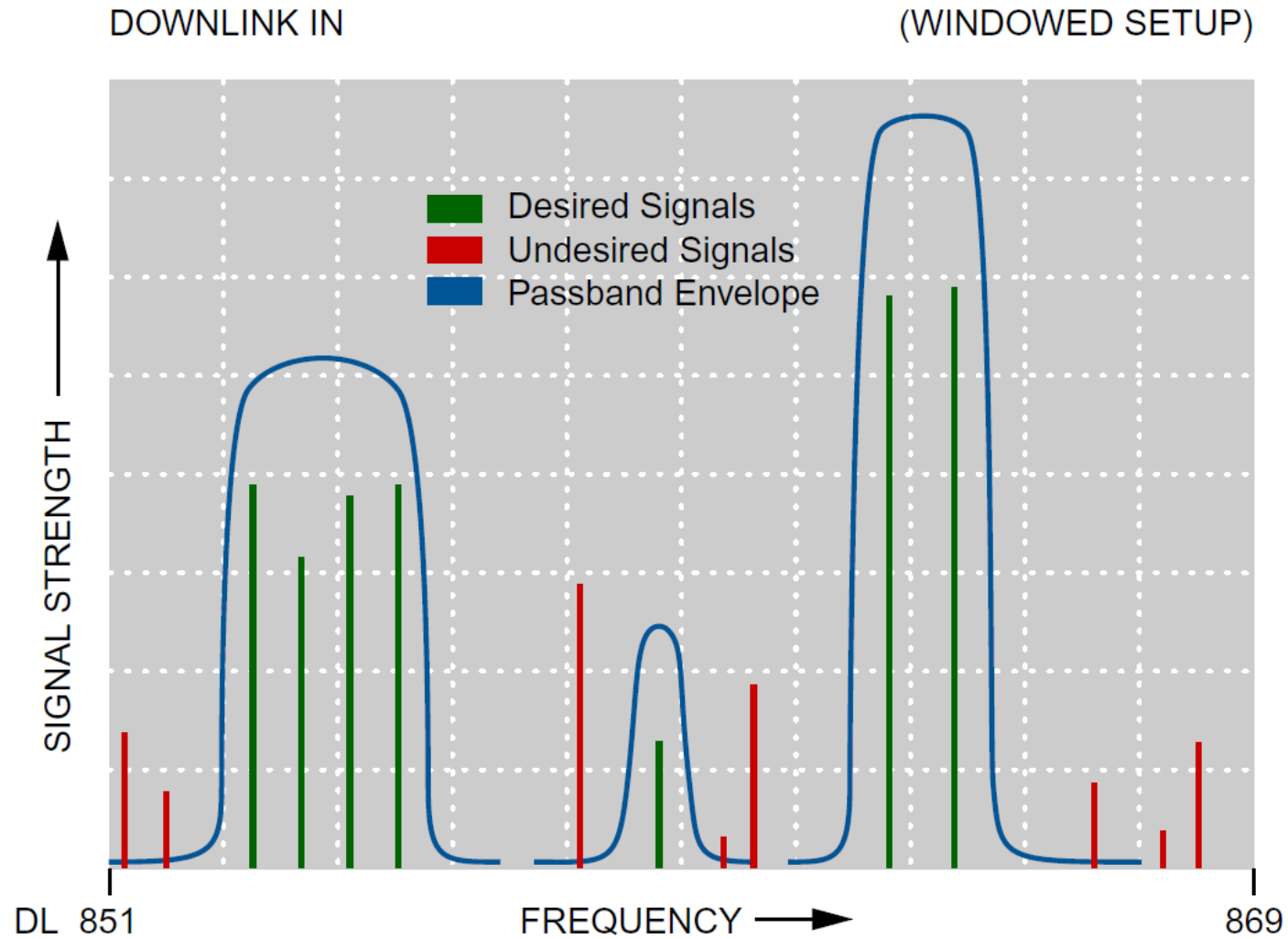


- Digital filters allow for the reduction of many common problems associated with analog filters, such as temperature drift, and individual component fluctuations over time.



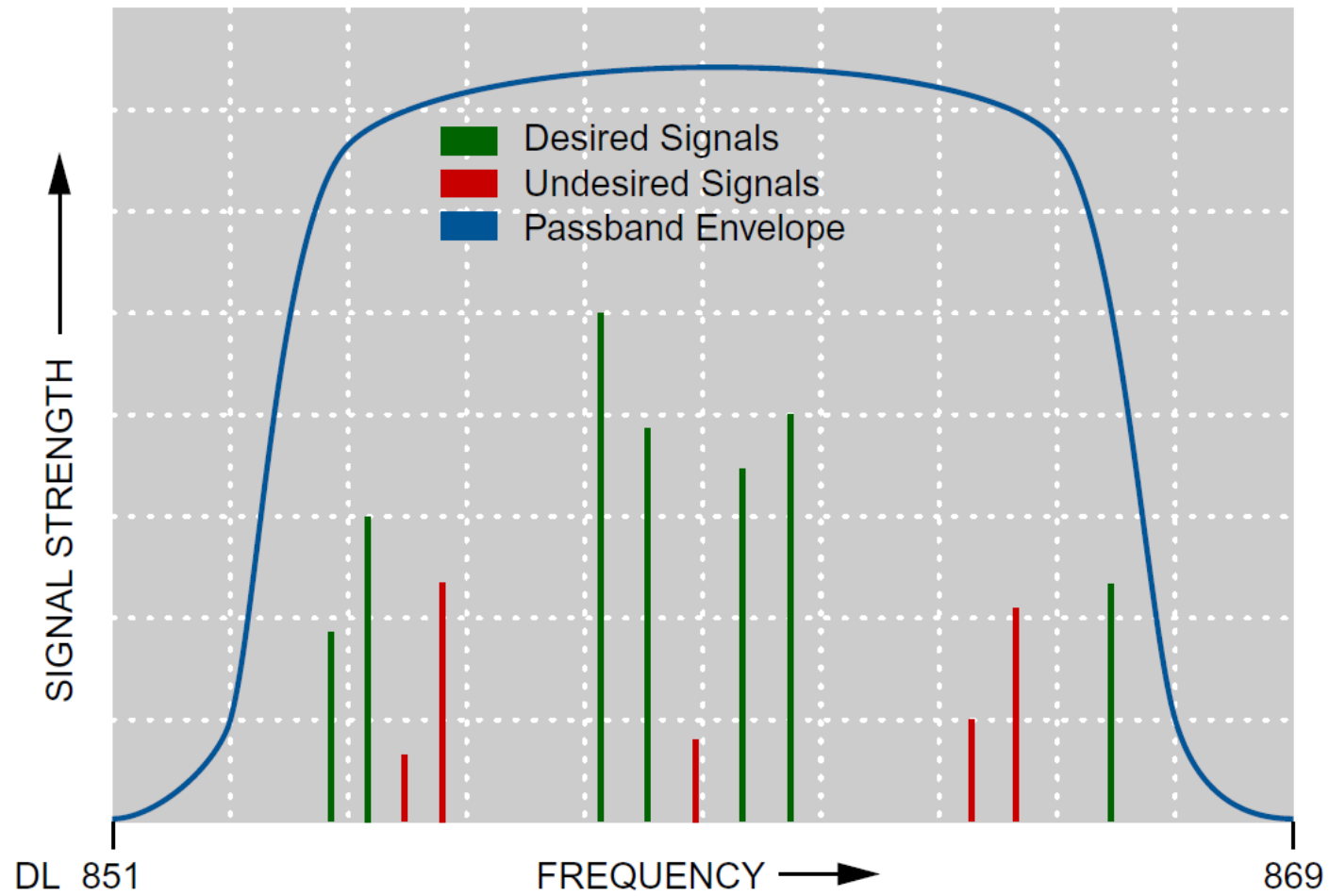
- The DSP used in the SBIII will allow the end user to design many standard and custom filtering solutions.

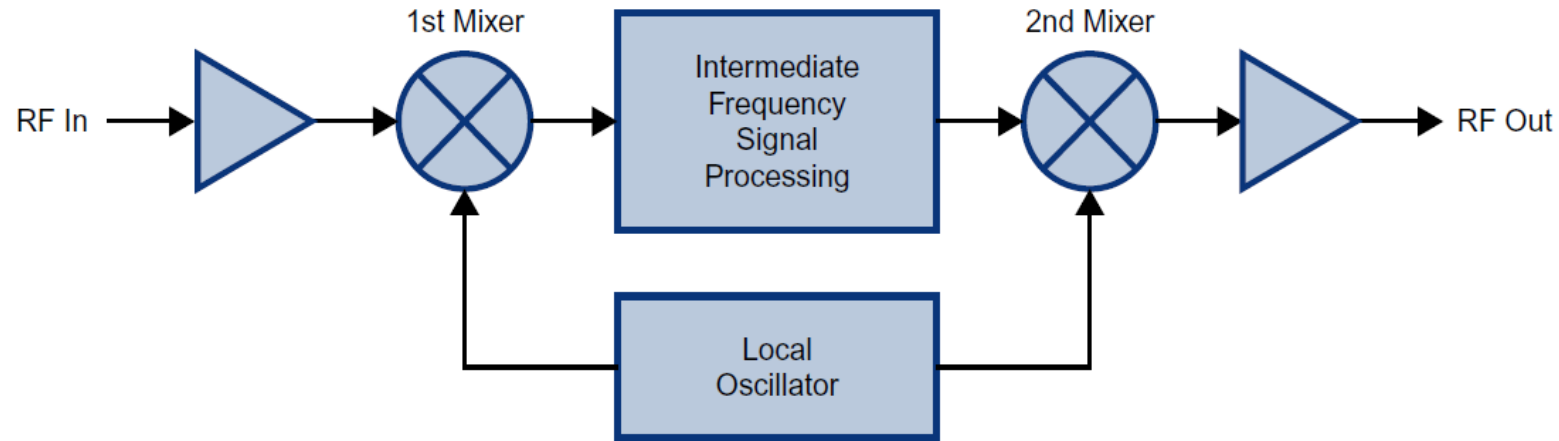




DOWNLINK IN

(WIDEBAND SETUP)





The main takeaway:
Frequency Out = Frequency In

The Signal Booster III is available in the following bands:

- **700/800: 613-8 Series**
- 764-806 MHz Single Band
- 806-869 MHz Single Band
- 764-806/806-869 MHz Dual Band

UHF: 614-7 series

- 450-470MHz Single Band
- 470-488MHz Single Band

Nomenclature and Model Number Configuration



Please use this Selection Guide to create the Signal Booster that meets your needs.

SBIII 764-806, 806-869 Series Selection Guide

613-8 ____ - ____ - ____ - ____

Example: 613-83B-AHH-G1A (Single Band)

Example: 613-83B-AAH-G1A (Dual Band)

700 / 800 MHz

Product Type	Frequency Band	Number of Channels	Channel Power	Enclosure	Options (Blank for No Options)
613-8 = Digital Signal Booster	3B = 764-806 MHz (Single Band)	A = 1-14 (700 MHz) or (800 MHz) Filter (Single Band)	HH = High Power Uplink and Downlink	G1A - Painted Steel Enclosure	N - NFPA/IFC Configuration
	9A = 806-869 MHz (Single Band)	B = 1-30 (700 MHz) or (800 MHz) Filter (Single Band)	HL = High Power Uplink and Low Power Downlink	G2A - Stainless Steel Enclosure	
	3E = 764-869 MHz (Dual Band)	AA = 1-14 (700 MHz) Filter and 1-14 (800 MHz) Filter (Dual Band)	LH = Low Power Uplink and High Power Downlink		
		BB = 1-30 (700 MHz) Filter and 1-30 (800 MHz) Filter (Dual Band)	LL = Low Power Uplink and Downlink		H - Dual Port (Head End)
		AB = 1-14 (700 MHz) Filter and 1-30 (800 MHz) Filter (Dual Band)	FH = High Power Fiber Remote		R - Dual Port (Remote End)
		BA = 1-30 (700 MHz) Filter and 1-14 (800 MHz) Filter (Dual Band)	FL = Low Power Fiber Remote		1 - 3 MHz Preselector NPSPAC Pre-Rebanding (866-869 MHz)
			HF = High Power Fiber Head=end		2 - 3 MHz Preselector NPSPAC Post-Rebanding (851-854 MHz)
			LF = Low Power Fiber Head=end		3 - 10 MHz Preselector (851-861 MHz)

Not
e

*Note 	1 - 3 MHz Preselector NPSPAC Pre-Rebanding (866-869 MHz)
	2 - 3 MHz Preselector NPSPAC Post-Rebanding (851-854 MHz)
	3 - 10 MHz Preselector (851-861 MHz)

- The narrowing preselector options are only needed in conditions of high out of band interference.
- They are installed on the DL in side of the BDA only. They will only allow passage of the frequencies noted above.
- When interfering frequencies are 40dB hotter than the desired carriers . If not, the digital filtering should suffice.

Nomenclature and Model Number Configuration



UHF



SBIII 450-470, 470-488 SERIES SELECTION GUIDE

614 - _____ - _____ - _____ - _____ - _____

Example: 614-70-A-HH-G1A = Digital Signal Booster, 450-470 MHz, 14 Filters, High Power UL / High Power DL, Gray Steel

Product Type	Frequency Band	# Filters	Channel Power	Enclosure
614 = UHF Digital Signal Booster	70 = 450-470 MHz 70A = 470-488 MHz	A = 14 Filters B = 28 Filters	HH = High Power UL/High Power DL HL = High Power UL/Low Power DL LH = Low Power UL/High Power DL LL = Low Power UL/Low Power DL	G1A = Gray Steel G2A = Stainless

*Note:

- ✓ 450 – 470 MHz Models, frequencies needed **must fit within a single 3.0 MHz window**
- ✓ 470 – 488 MHz Models, frequencies needed **must fit within a single 1.5 MHz window**

- **613-8 Example:**

- I have 20 channels @ 800MHz, and 8 channels @ 700MHz. I need
- High power output to feed the DAS. I require reduced power for the UL.
- I also require NFPA Compliance.



- Referencing previous slide's Selection Guide:

• **613 - 8**

Digital
Signal
Booster

3E

764 –
869 MHz
Dual Band

–

AB

14 Filter 700MHz
30 Filter 800 MHz
Dual Band

LH

Low Power
UL
High Power
DL

–

G1A

Painted
Steel
Enclosure

–

N

NFPA
Compliant
Configuration

Optional Accessories

- Battery Backups
- Alarm Panels
- Passive Components:
 - Couplers
 - Power Dividers
 - Power Tappers
 - Combiners



- Uninterruptable Power Supply
- 24VDC
- Integrated Battery Charger
- Status Indicators
- Terminals for Remote Monitoring
- NFPA Compliant
- Models:

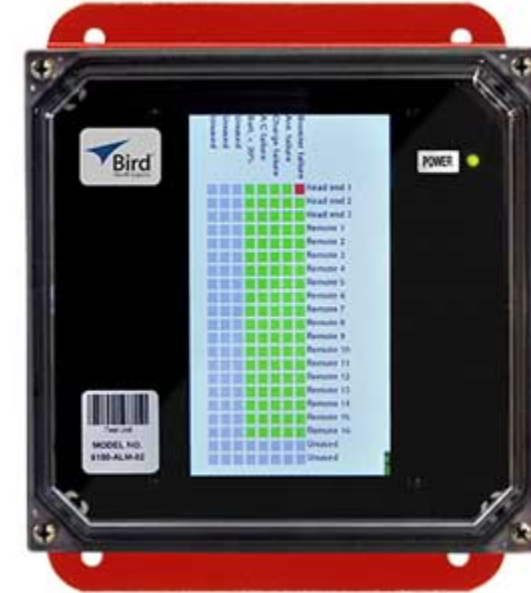


- Model Number: 6150-ALM-01
- Monitors all 5 NFPA Alarms
 - AC Power Failure
 - Battery Charger Failure
 - Low Battery
 - Donor Antenna Failure
 - Booster Failure
- At a glance alarm status



Fiber Fed – Alarm Panel

- Model Number: 6150-ALM-02
- Monitors all 5 NFPA Alarms
 - AC Power Failure
 - Battery Charger Failure
 - Low Battery
 - Donor Antenna Failure
 - Booster Failure
- At a glance alarm status for head end and all remotes in the system
- Monitors and alarms communications Link Failures
- PoE for power and communication (from Head End)
- Alarm output connector to Fire panel



Thoughts on Custom Designs:

- Bird has long established not only the ability but the willingness to take on custom designs for Public Safety products.
- Strategic decision that enables us to not only capture revenue that we would otherwise miss but also guides our long-term development by providing insight into the direction of the market.
- Any of our public safety and DAS products can be considered to solve unique customer challenges. With such a large set of products to draw from, we have an enormous capability to create solutions for difficult customer applications.
- Few actions can build customer loyalty and confidence as well as solving an intractable problem for them.
- Although our VHF (132-174 MHz) boosters are still offered, we now require all of these opportunities go through our applications engineers for review.
- Important! – Start with Application's Questionnaire



30303 Aurora Rd. Solon OH 44139
P: 866.695.4569
www.birdrf.com

SIGNAL BOOSTER APPLICATION SYSTEM DESIGN QUESTIONNAIRE

INITIAL REQUEST DATE: _____ Company: _____

Address: _____

Project Name: _____

Contact Person: _____ Phone #: _____

Email: _____

***Sections 1 and 2, with *, are required information critical to the design of the booster.**

1. *** Frequency:** (if need more room, please attach a separate frequency list)

DOWNLINK FREQS (BASE TO PORTABLE)	UPLINK FREQS (PORTABLE TO BASE)	INTERFERENCE FREQS	AMPLITUDE of INTERFERENCE

***For RF congested locations where interference is expected, it is recommended to have a detailed site survey including spectral analysis of the RF environment. If such surveys and tests are not performed, the booster design will be based solely on the information provided by the customer in this document.**

2. *** Desired booster gain:** _____ dB (Typical gain, 450-512MHz and 700/800MHz, 80 dB, 132-174MHz, 60dB).

*If you need help determining the necessary gain, please provide the following info:

- What is the distance from the donor (base/repeater station) to the signal booster site? _____ Miles
- What is the donor (base/repeater station) output power ERP (out of the TX antenna)? _____ dBm or W
- Is the signal path from the base station antenna to the site antenna restricted or clear? _____
(If the path is restricted, a received signal strength measurement at the proposed booster site antenna location is desirable in order to determine path loss)
- What is the incoming signal level from the donor to the roof-top antenna at the booster site? _____ dBm

3. **Special/optional features (if left blank, we will provide standard configuration with the lowest cost)**

- Power supply (default is 110VAC W/ Aux DC input) _____
- Is a hardwired connection with conduit required per local codes (default may be pigtail AC cord w/ external connection points) _____ Yes or No _____
- NFPA Compliant features _____ Yes or No _____
- Battery backup _____ Yes or No _____ 12 or 24 Hr. operation _____
- Dedicated Signal Booster Alarm Panel _____ Yes or No _____
 - Secondary summed alarm connection needed, e.g. main fire panel _____ Yes or No _____
- Enclosure preference (default choice is painted grey NEMA4) _____



30303 Aurora Rd. Solon OH 44139
P: 866.695.4569
www.birdrf.com

1. **Additional information (*important for digital channel-selective booster application)**

- What type of modulation is the signal? _____ is it Simulcast? _____
- What is the modulation BW of the signal (6.25 kHz, 12.5 kHz, and 25 kHz)? _____
- What type of Channel Access method is the signal (TDMA, CDMA, other)? _____

2. **DAS Design: *If help is needed designing the DAS system, the following information is needed*.**

- Distributed Antennas, radiating cable, or need recommendation from us? _____
- Make and model of cable you plan to use _____
- Please provide blueprints of floor layout that include dimensions.** Please indicate the following:
 - Which floors require coverage _____
 - Preferred location of the signal booster _____
 - Location of risers to run cable between floors _____
 - Location of rooftop donor antenna _____
 - Any known problem area, e.g. Basements, X-ray Labs, etc. _____
 - Any additional comment related to the DAS _____

3. **Business information:**

- When do you need the quote by? (Typical quote turn-around time is 1 -2 week after we receive the completed questionnaire.) _____
- What is the expected order date? _____
- What is the expected installation date? _____

Additional comments on the application: _____

***Disclaimer: The Product consultation and recommendations provided by Bird are for the customer's preliminary design reference only. Bird does not provide or imply any guarantee of system level performance.**

***Signal Booster designs and conceptual drawings provided by Bird are preliminary only. The system integrator should review all documents for accuracy. Products sold by Bird will meet published specifications. The system integrator is solely responsible for the system design to include antenna locations and selection, cable types and pathways, craftsmanship, RF interference, as well as any other aspects of the project that may affect system performance.**

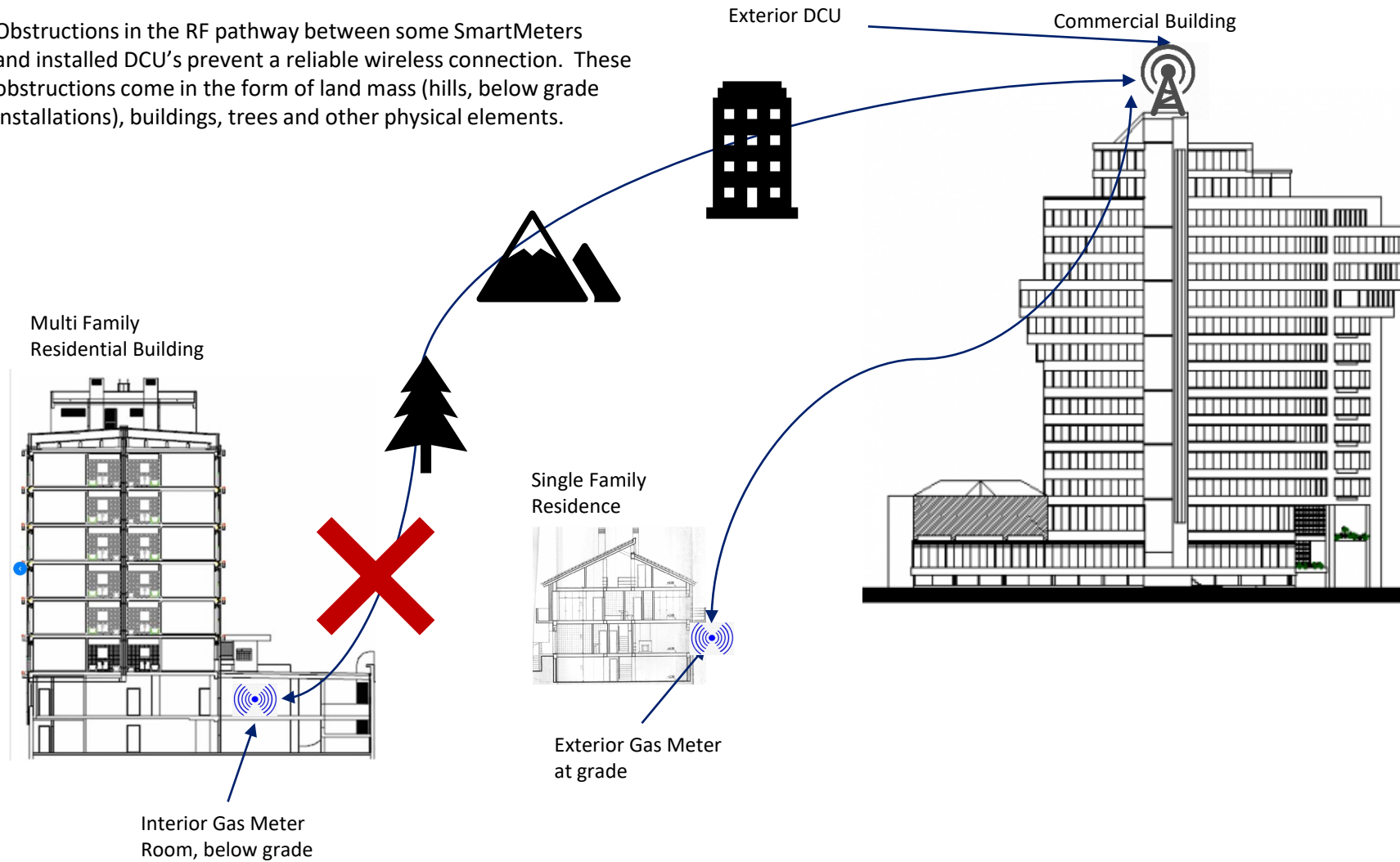
Smart Meter Repeater



Smart Meter Repeater



Obstructions in the RF pathway between some SmartMeters and installed DCU's prevent a reliable wireless connection. These obstructions come in the form of land mass (hills, below grade installations), buildings, trees and other physical elements.



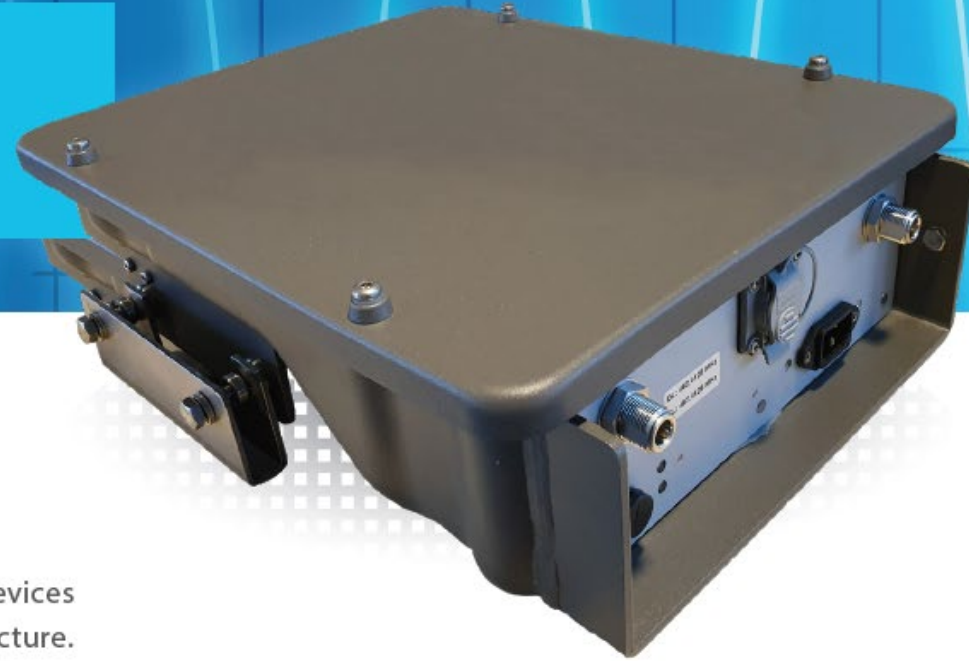
Smart Meter Repeater



DMR 604 Unit

Reliable Connectivity

Smart Meters have been at the forefront of the connected devices revolution, laying the foundation for a more secure infrastructure. However, the interior meter locations are not always conducive to good communications and other obstructions for wireless communication can inhibit connectivity. Bird has a solution to these obstacles - the Smart Meter Repeater. This repeater is a signal booster that creates a secondary, more flexible, path for the Smart Meter to connect remotely with its mobile collection units.



Bird's highly configurable design allows for targeted solutions for your specific application, limiting expense and complexity. Bird has decades of experience solving similar but more complex issues for our First Responders in the Public Safety market, let us configure a solution for you.

Questions



For more information please contact:

sales@birdrf.com

For technical support & questions, please contact:

AppEngineering@birdrf.com

For certification, please email sales@birdrf.com

Get Connected

www.birdrf.com

