
creo TECH
Instruments S.A.

Company history

Creotech Instruments S.A.:

- Creotech Ltd. was founded in 2008 by three scientists of Warsaw University and Warsaw University of Technology, who also worked at CERN, Switzerland
- 2011 – joint-stock company Creotech Instruments S.A. was created, employment: 5 full time job equivalents (FTJE)
- 2013 – first cleanroom facility built 30m^2, start of space projects

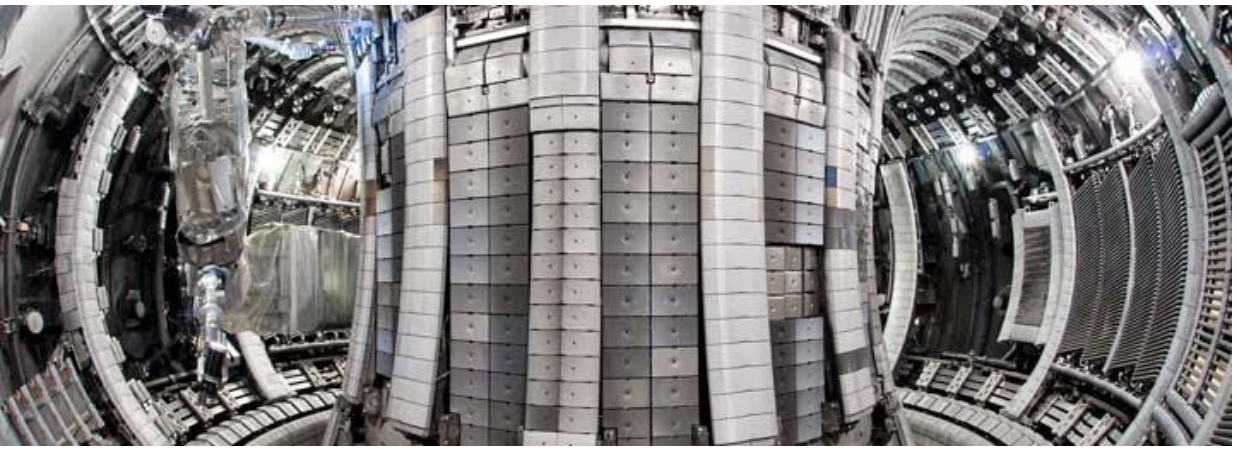
Company history cont.

Creotech Instruments S.A.:

- August 2014 – state owned Industrial Development Agency invested in Creotech – (the first investment of the Polish state in a private company after II WW), 14 FTJE
- May 2015 – second cleanroom 100m^2 , operational, 8 space projects in realisation (7 for for ESA) , 5 in logbook (4 for ESA), 4 projects for scientific facilities in realisation, 16 R&D projects, 52 persons (4 PhD, 35 engineers)
- June 2015 – working on 2 proposals on micro satellite development and integration, including AIS-SAT-PL with other Polish companies
- Automatic electronics assembly line operational

Clients & Partners

Our proprietary solutions were tested in international research projects



CERN · Uniwersytet Warszawski · PAN Polska Akademia Nauk · Politechnika Warszawska · NIKHEF · CBK PAN · IFPiLM Euratom · AGH · GSI · DESY · DARPA · iter · National Instruments · diamond

Laboratory nad production falcilities

Creotech technological base

- Imaging systems based on high-end, high resolution digital cameras
- Electronic signal processing systems
- Instruments and satellite subsystems
- Electronics assembly technologies according to IPC, MIL, ECSS standards
- Mechatronics manufacturing

Scientific applications

- High resolution image acquisition and processing – e.g. Pi-of-the-Sky (K20) (Gamma Ray Bursts observations in Las Campanas Observatory, Chile); K30, K40 cameras
- Scientific apparatus for measurements and control of experiments in physics, biology, medicine, engineering, including large scientific facilities like accelerators, thermonuclear reactors, plasma reactors
- Sub-nanosecond time, event and frequency synchronisation platform, lossless transmission of analogue signals
- Control & monitoring systems, power suppliers, …
- Open Hardware Repository projects

Space applications

- Digital cameras for telescopes (e.g. Pi-of-the-Sky, NEO applications), navigation, star-trackers, hiperspectral imaging
- Satellite power supply
- Satellite platform and instrument computers, FPGA modules
- Precise instruments (e.g. detectors) and mechanisms
- Electronics assembly according to ESA standards
- Integration of satellite systems
- Ground station apparatus
- Electrical ground support equipment (simulation and testing), MTCA standard possible

Examples: Pi-of-the-sky

Las Campanas Observatory, Chile

Examples: K20 Camera

- Sensor: Fairchild CCD442A 2048x2048 pixels
- USB 2.0 & 1000T Interface
- Programmable exposure and readout time (1s-100s)
- uC software and FPGA upgrade via USB
- Peltier cooling of CCD
- Humidity and temp. measurement inside and outside chamber (CCD, case, ambient)
- Build-in mechanical shutter
- Focusing motor control

Results from observing the most powerful cosmic explosion

http://grb.fuw.edu.pl/pi/

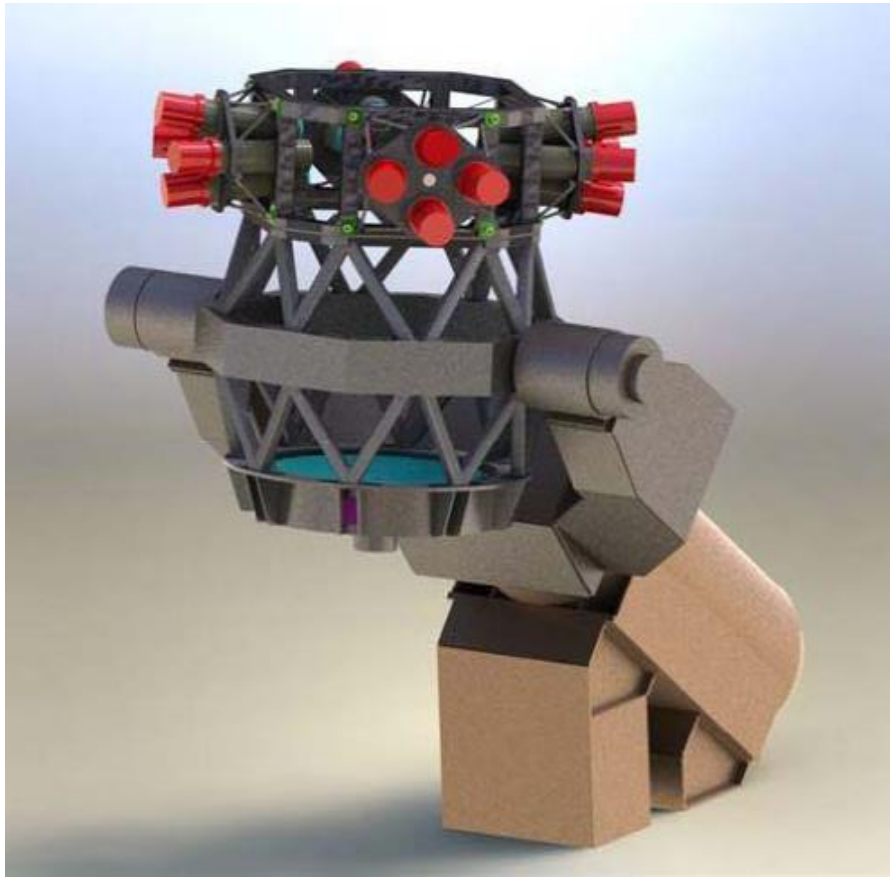
Polish robotic telescope "Pi of the Sky" got the data crucial for understanding this phenomenon
***Nature* issue of 11.09.2008 brings newest results about the gamma ray burst GRB080319B.** This name was given to a powerful cosmic explosion observed 19.03.2008. It happened 7.5 billions of light years away, half across the visible Universe. It was so bright that it could be visible by a naked eye. Polish robotic telescope "Pi of the Sky" was the first to observe the light. Gamma rays were detected by NASA satellite "Swift".
"Pi of the Sky" and "Swift" data together with other satellite and ground-based observations gave a lot of important information about this burst. Never before scientists got so many precise data about this kind of phenomenon.
The results will be presented at the NASA press conference scheduled for Tuesday 1:00 PM EDT. It will be covered by NASA Radio.

Present Pi-of-the-sky

- INTA – El Arenosillo observatory in Mazagón near Huelva
- 2 x 16 CCD cameras, 2000x2000 pixels, 5-10s exposures
- optics: f=85mm, f/d=1.2 lenses, FOV ~22^{o}x22^{o}
- covers 2 sr of the sky (=Glast LAT FoV > Swift BAT FoV)
- data stream ~128 MB/s i.e. ~5 TB/night (USB 2.0 interface)
- the whole night sky stored for ~12 hours
- on-line analysis: automatic flash recognition in real time by a multilevel trigger system
- fast reaction to GCN triggers
- off-line analysis (next day): standard photometry and astrometry up to 14m (variables, asteroids)

INTA - El Arenosillo observatory in Mazagón near Huelva

Camera for NEO Survey Telescope



Examples: WR synchronisation platform

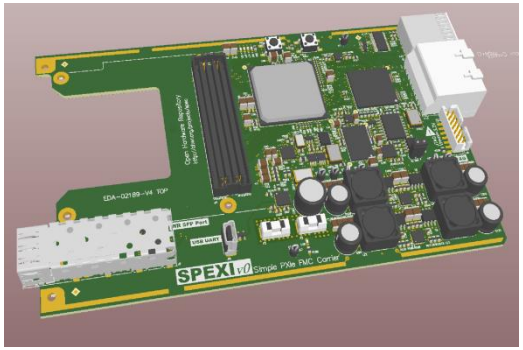
WR synchronisation platform is an extensible measurement and control platform based on Gigabit Ethernet and IEEE1588 protocol.

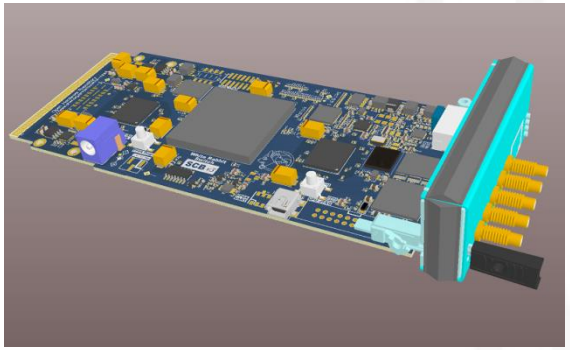
It provides sub-nanosecond synchronisation of all its components. It has been developed by CERN in cooperation with several companies and scientific organisations, including Creotech.

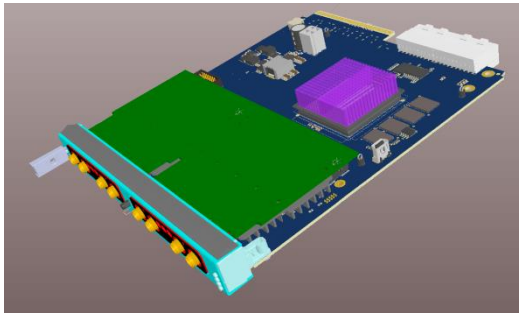
The first implementation of the system took place at CERN in synchronisation of the beam steering magnets in the particle accelerators.

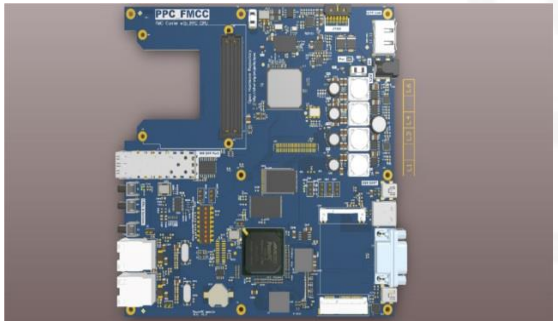
Development of WR nodes & switches for many platforms

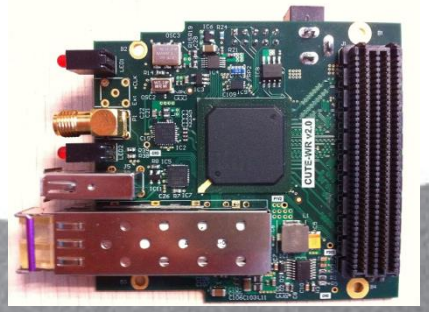
- PXI
- FMC
- ATCA/uTCA
- UTCA MCH
- Stand-alone
- VME
- PCIe





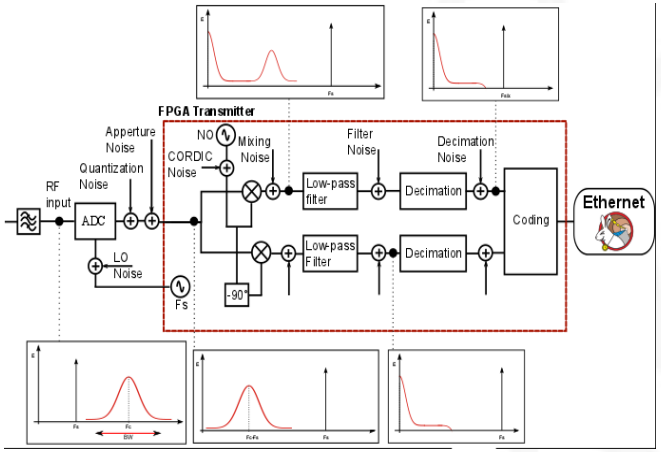


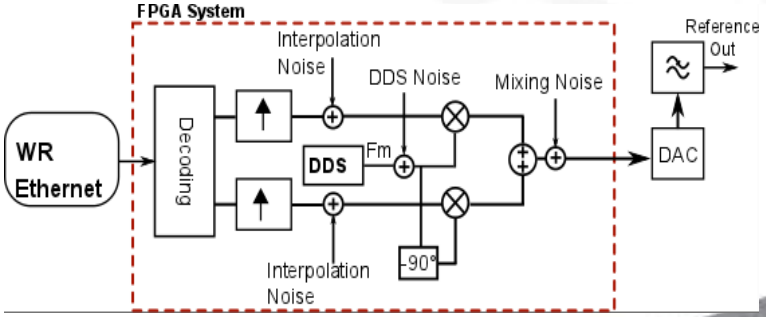




Distributed RF over WR (WR-DRF)

- Ability to analyze and generate any low bandwidth RF signal
- Phase preservation





Multi channel distributed oscilloscope / Data Acquisition System

- Thousands of channels (up to 256 per single box)
- Up to several GS/s
- Synchronized with several ps accuracy
- On-line processing & triggering on events

MTCA electronics standard

Reference Specification for Management

PICMG 3.0

AdvancedTCA Base Specification
(Telco-centric spec)

Reference Specification for Board Implementation

AMC.0

AdvancedTCA Mezzanine Cards Base Specification
(Telco-centric spec)

MTCA Application Guide

Environmental and capability comparison between MicroTCA specifications

MTCA.0

MicroTCA Air-Cooled Base Specification
Environment: Controlled Telco/Industrial
(Telco-centric spec)

MTCA.1

Rugged Air Cooled Specifications
Environment:
Extended Telco / Industry
(Telco/Industrial-centric)

MTCA.2

Hardened Hybrid Air/Conduction Cooled Specifications
Environment: Military
(MIL-centric)

MTCA.3

Hardened Conduction Cooled Specifications
Environment:
Extended Telco / Military
(MIL-centric)

MTCA.4

Enhancements for Rear I/O and Precision Timing
AMC, MicroRTM, Shelf
(High Energy Physics-centric)

MicroTCA Ruggedization Specification

MicroTCA Capabilities Specification

CS-12E-96-003

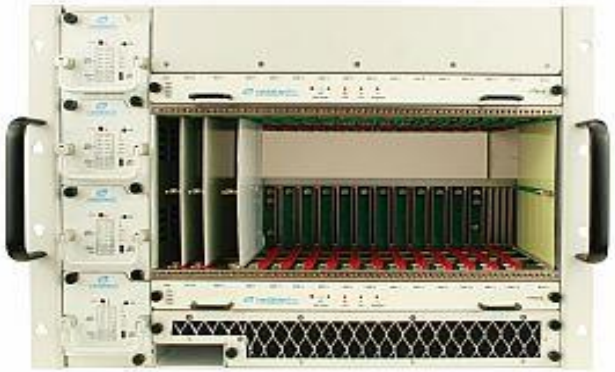
Examples of MTCA

MTCA.0

MTCA.1

MTCA.3

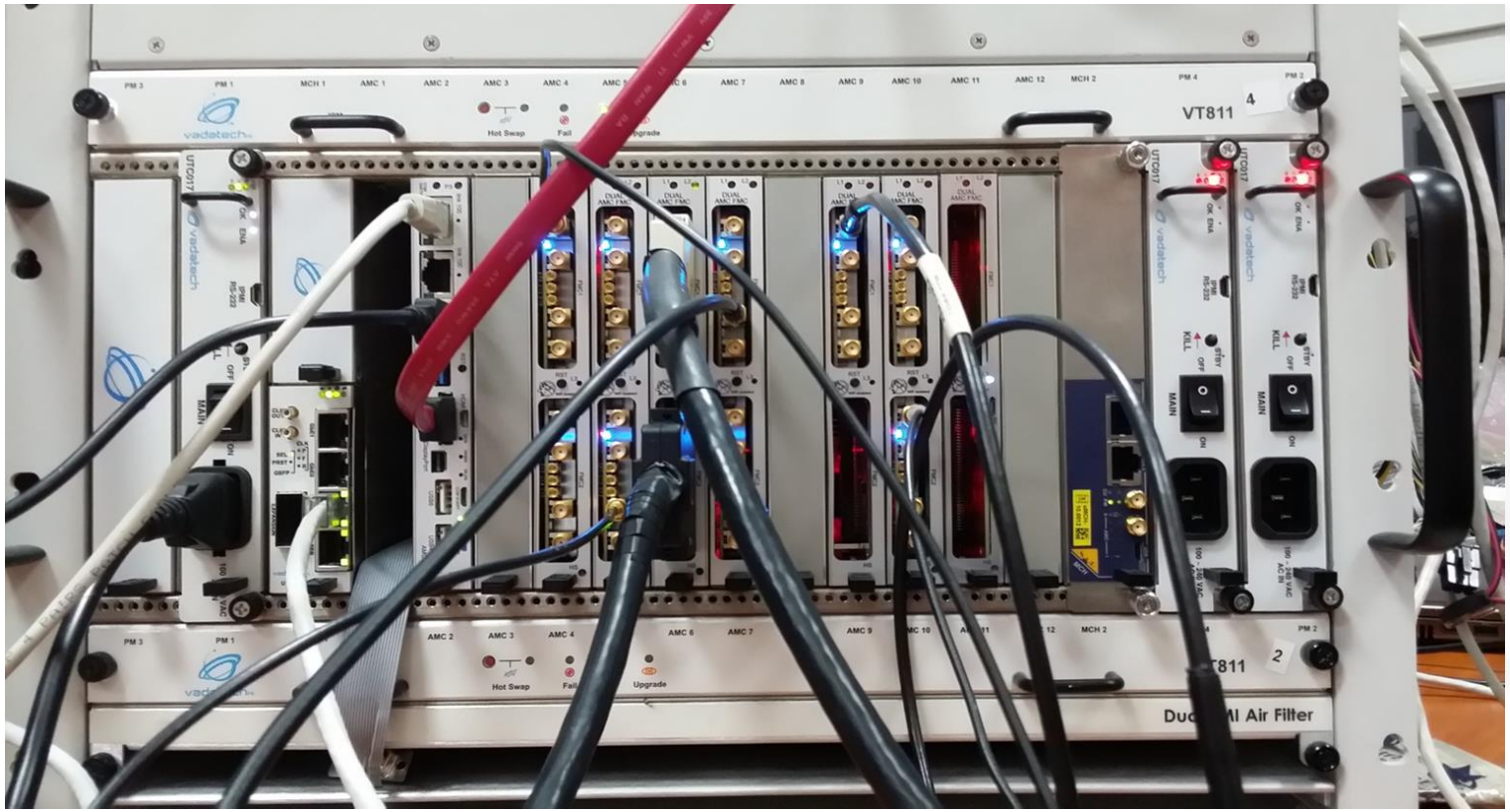
MTCA.4



MTCA.2

Military / aviation MTCA

Industrial version of MTCA



Creotech’s implementation – system for an accelerator beam trajectory measurement – 40 channels ADC 250MHz, 16bit + DSP

Example of MTCA application at NASA – Space Network Ground Segment Sustainment

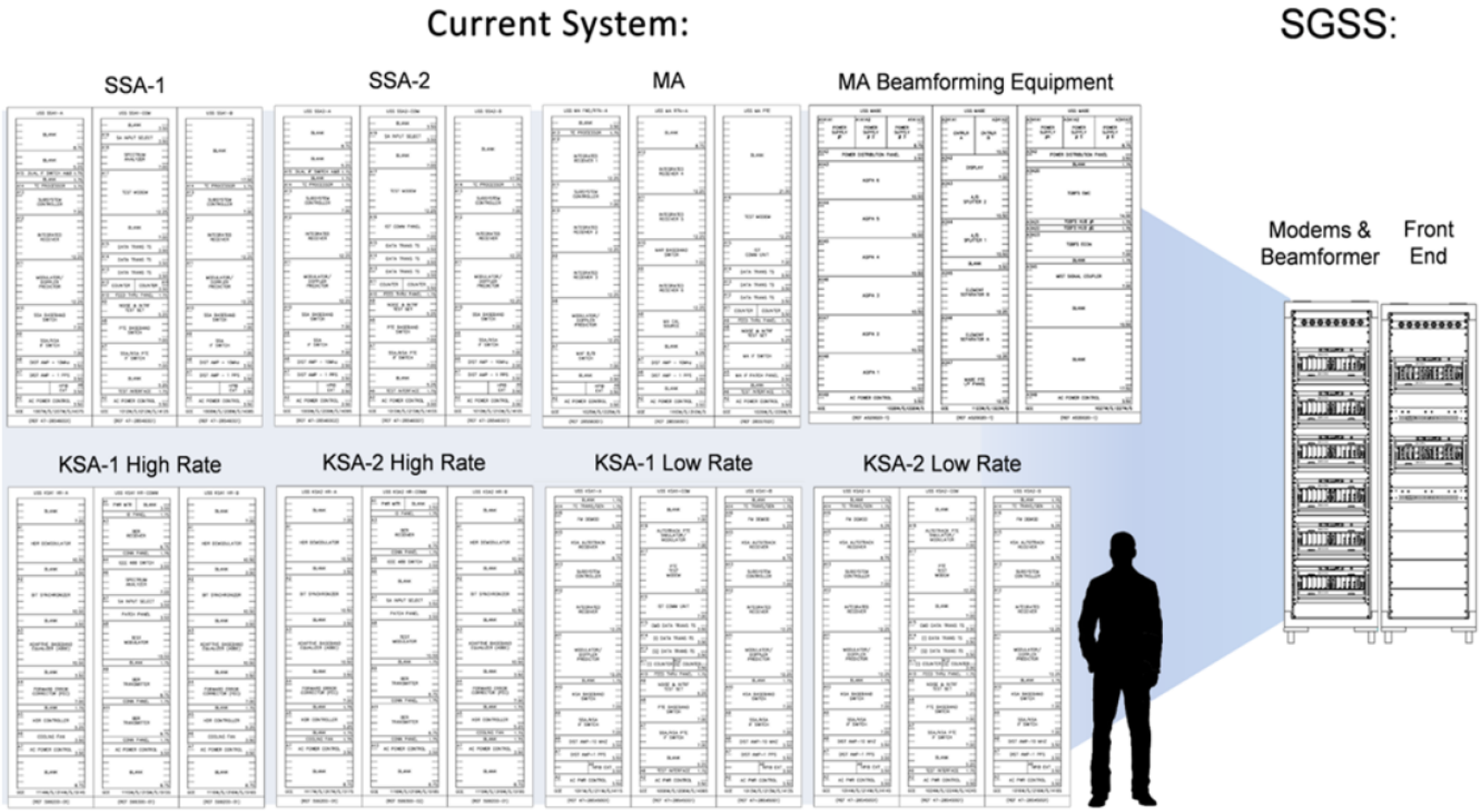


Figure 10. Size Reduction Projection for the DSP Element.

Thank you for your attention

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