Raptor Universe 2025

Presented by:
Parker Mosman, Chief Product Officer, New Eagle

Where We're Going

INNOVATE FASTER. SCALE SMARTER
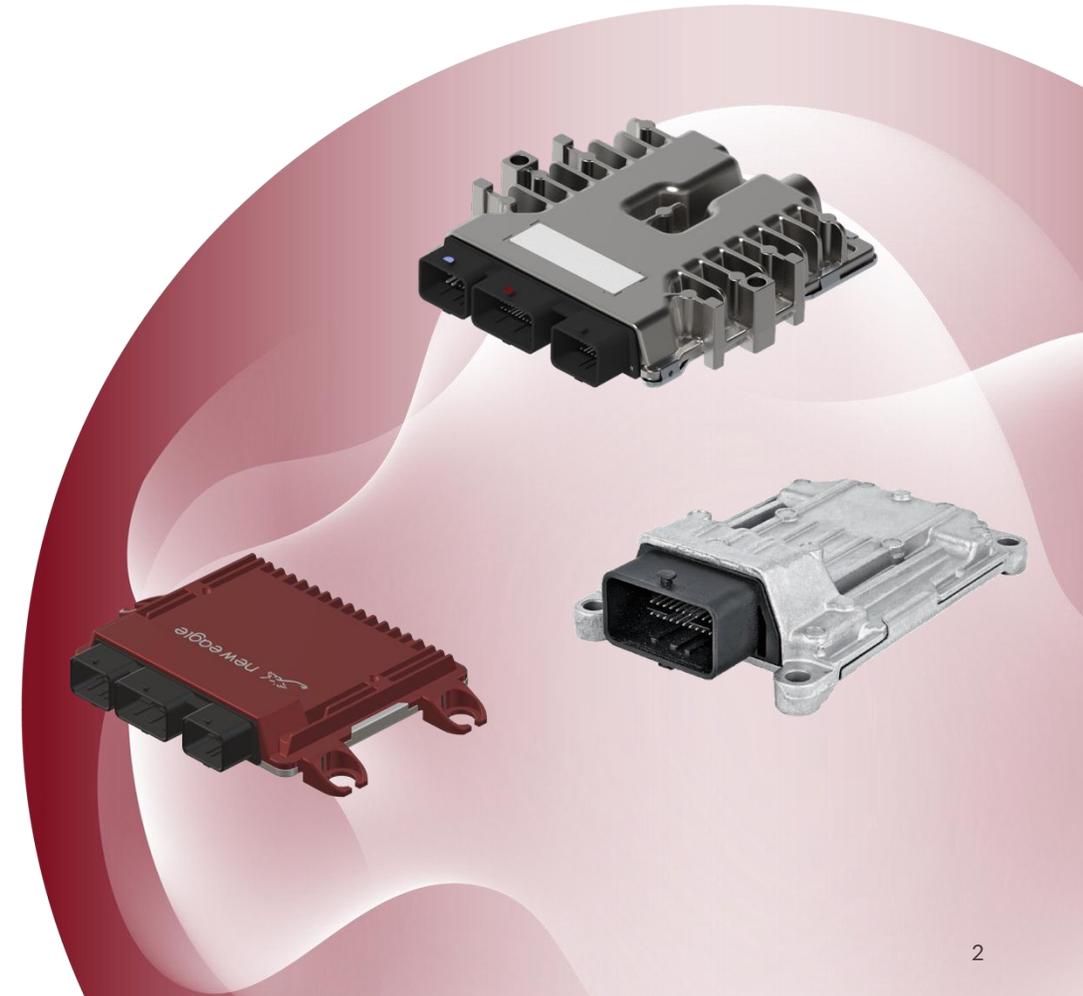
A Year In Review (Hardware)

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2025 ECU Launches

Already Available As Of Raptor 2024b v2.0

To Be Released In Raptor 2025b

GCM108 (M2-501)

JOHN DEERE

High channel count hydraulic controller with powerful compute

- 16x independent hydraulic control channels
- Powerful 3 core TC277 MCU
- 20x high side channels
- Automotive ethernet & 3x CAN-FD

GCM44 (M2-031)

JOHN DEERE

Cost optimized hydraulic controller ideal for distributed systems

- 2 independent hydraulic control channels (potential for 4)
- Single core TC234 MCU
- 3x high side channels
- 2x CAN-FD

GCM112 (M2-411)

JOHN DEERE

High-performance general-purpose ECU

- Powerful 3 core TC377 MCU with 300MHz cores
- Integrated accelerometer
- Balanced mix of inputs and outputs
- 2x CAN-FD

CCM112

High-performance fail operational gateway controller

- Dual TC397 and TC377 MCUs linked via SPI/HSSL
- 8x shared CAN-FD & 2x independent automotive ethernet
- 24x high side channels
- Advanced security functions powered by ETAS CycurHSM

Active ECU Portfolio

Our ECU portfolio scales to meet your performance, I/O, and cost requirements

- MCUs ranging from single core Z0 PowerPC through six core with four lockstep TriCore

- Covers a wide range of application domains with a <u>single toolchain</u>, including:
  - Power distribution
  - Rugged hydraulic control
  - Supervisory & vehicle control
  - Basic & advanced gateway applications
  - Fuel cell control

- Options for functional safety and cybersecurity span the portfolio

- All newly added ECUs supported by a <u>single compiler license</u> (HighTec TriCore Platform Compiler) and a common OS (ETAS RTA-OS)

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GCM48   RCM80   RCM112   CCM112

GCM44   GCM56   GCM111   GCM112

GCM106

Support for all highlighted ECUs added since Raptor 2023a!

GCM108

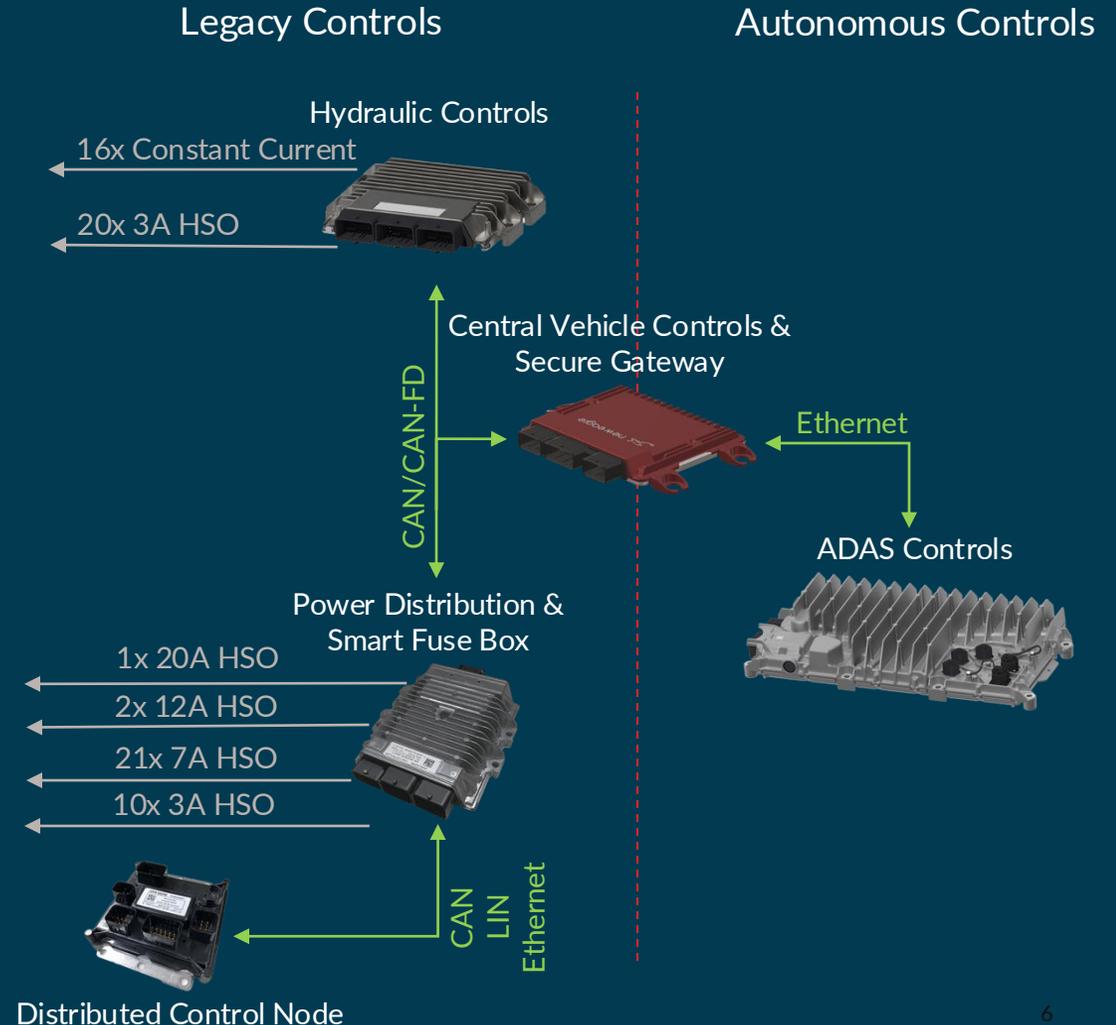# A Complete E/E Architecture With A Single Toolchain

Raptor can now solve (almost) all of your problems

Dramatically streamline development time and reduce program risk by commonizing on a single toolchain

- Move IP freely between ECUs in minutes
- Leverage common communication functions to establish safe and secure communication in minutes
- Drive out the inefficiencies of managing multiple application development environments within a single vehicle development team

Recoup toolchain investment time and time again

- Raptor and relevant add-on products support all ECUs in the portfolio through a single license
- Includes Raptor-Safe tooling

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Legacy Controls | Autonomous Controls

Hydraulic Controls
16x Constant Current
20x 3A HSO

Central Vehicle Controls & Secure Gateway

CAN/CAN-FD

Ethernet

ADAS Controls

Power Distribution & Smart Fuse Box
1x 20A HSO
2x 12A HSO
21x 7A HSO
10x 3A HSO

CAN LIN Ethernet

Distributed Control Node

A Year In Review
(Software)

2025 Raptor Enhancements

Substantial enhancements available in Raptor 2025b

Supported in Raptor 2025a

J1939-21 <-> J1939-22 Gateway

Seamlessly translates data between legacy high-speed CAN and CAN-FD networks

- Raptor handles message format translation between -21 and -22 networks

- Configurable via Vector DBC file or graphical interface

- Supports functional safety and cybersecurity payload fields

- Presently supported on RCM112 and CCM112. Support coming to additional targets.

J1939-91C Support

Raptor supports next generation J1939 cybersecurity features today

- Raptor supports the network leader persona with network follower support coming later

- Supported on RCM112 based on software cryptography

- Support for CCM112 based on hardware security module (HSM) implementation leveraging ETAS CycurHSM available in Raptor 2025b

DoIP Gateway

Dramatically reduces OTA update and remote diagnostic complexity

- New Eagle ECU serves as interface between telematics unit and rest of the vehicle

- Raptor translates DoIP frames on Ethernet to UDS frames on CAN

- "Near zero" programming required at Raptor level

- Presently supported on RCM112. Support coming to CCM112, GCM106, & GCM108

Raptor Astrée

Ensures generated code is free from run-time defects

- Able to detect divide by zero, index out of bounds, dereference of uninitialized pointer, and many others

- Configurable to check MISRA, CERT-C, and other common rulesets as part of analysis

- Configurable to compute software metrics such as cyclomatic complexity, number of returns, and comment density

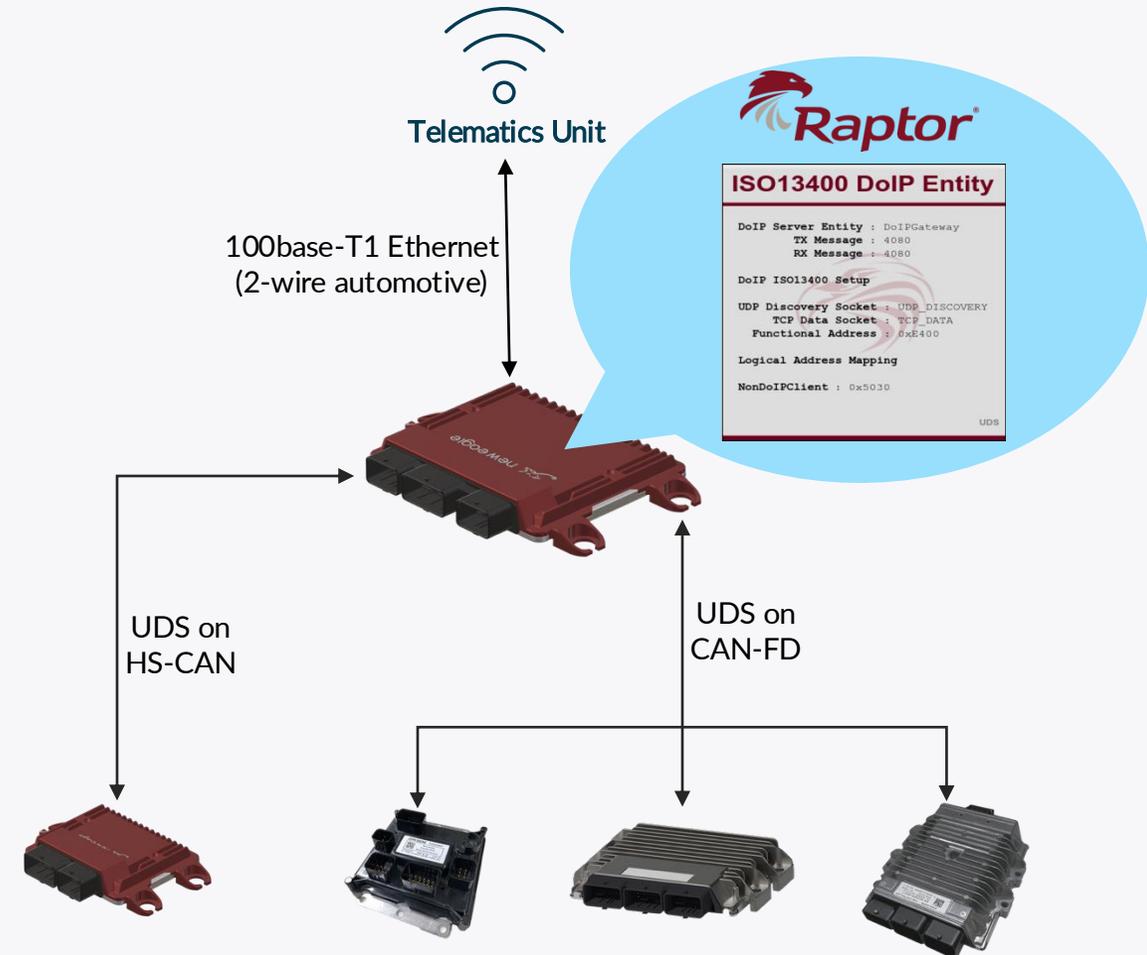INNOVATE FASTER. SCALE SMARTER

DoIP Gateway Architecture

Raptor powered ECUs drastically reduce complexity of OTA updates

New Eagle ECU serves as gateway between the vehicle telematics unit and downstream ECUs

- DoIP protocol allows for high-speed communication on two wires between TCU and New Eagle gateway
- New Eagle ECU routes traffic to appropriate CAN bus containing the target ECU
- Process can play out while the same New Eagle ECU performs other advanced control functions

Supports both OTA reprogramming and remote diagnostic functions

- Also supports 3rd party ECUs
- Future Raptor updates will add support for gateway function to additional New Eagle ECUs

Telematics Unit

100base-T1 Ethernet
(2-wire automotive)

ISO13400 DoIP Entity

DoIP Server Entity : DoIPGateway
          TX Message : 4080
          RX Message : 4080

DoIP ISO13400 Setup

UDP Discovery Socket : UDP_DISCOVERY
     TCP Data Socket : TCP_DATA
  Functional Address : 0xE400

Logical Address Mapping

NonDoIPClient : 0x5030

UDS on
HS-CAN

UDS on
CAN-FD

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Advanced J1939 Support

Raptor seamlessly handles protocol translation while your App keeps working

Legacy J1939-21 networks incompatible with J1939-22

- The -22 standard forbids -21 messages on a -22 network
- The -22 standard uses a newly imagined frame format to maximize CAN-FD network utilization
- One -22 frame can contain many -21 payloads

Raptor eliminates the need for user code to manage this translation process

- Includes the ability to attach E2E and SecOc to data payloads
- Optimized for multicore processing to keep application cores available for complex control functions
- Translation works in both directions, not just -21 -> -22

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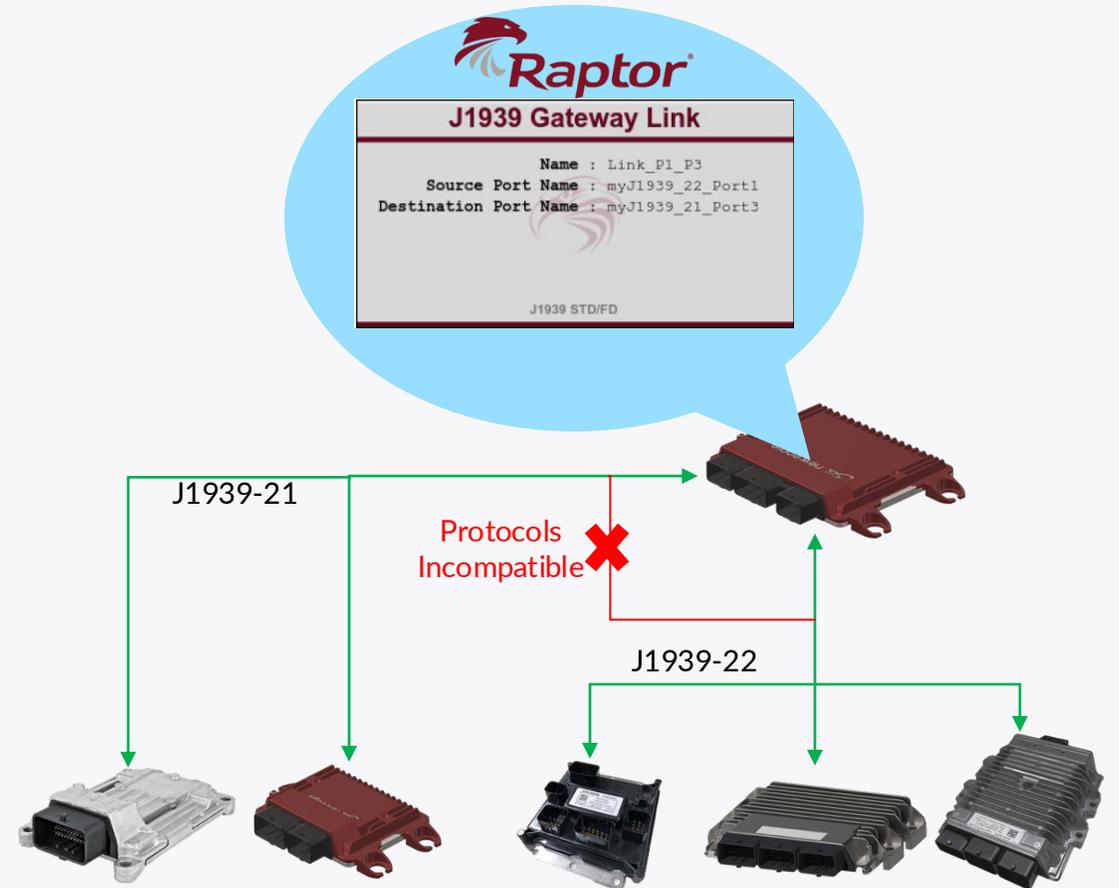
Raptor Safe Recap

All referenced ECUs supported in Raptor Safe as of Raptor 2025a

Raptor Stack Check: Uses the executable produced by Raptor to compute worst case stack consumption for each task and ISR

- Enabled by the addition of a single Raptor block to your model

- Output available in plain text in Simulink, as well as highly configurable reports with navigable call graphs

- Handles dual stack on TriCore targets

- A single license today supports RCM112, CCM112, RCM80, GCM48, GCM111, GCM106, and GCM56, with more targets added constantly
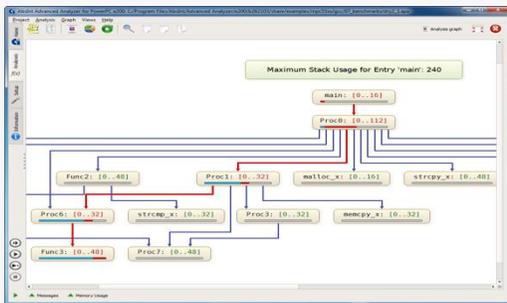
Raptor Time Check: Uses the executable produced by Raptor to estimate worst case execution time for each task and ISR

- Enabled by the addition of a single Raptor block to your model

- Output available in plain text in Simulink, as well as highly configurable reports with navigable call graphs

- Key assumptions impacting performance configurable at Raptor level, such as cache hit model

- A single license today supports CCM112, GCM48, RCM80, and RCM112, with more targets added constantly
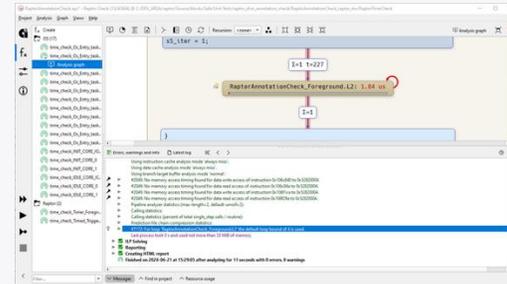
Introducing Raptor Astrée

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Raptor Astrée Already Supported on RCM112 and CCM112 in Raptor 2025a

Validate Your Code

Formally prove the absence of:

- Divide by zero, index out of bounds, arithmetic overflow/underflow, and other common defects

- Data races in both single core and multi core contexts

- Use of uninitialized memory (e.g. pointers)

Saves thousands of manhours lost to iterative development when bugs are discovered later in the process

Qualification kit for ISO 26262 available

Standardize Your Code

Ensure your code complies with numerous standards through automation

- MISRA-C, CERT-C, CWE, etc.

- Adaptable to support checking your own internal coding standards

- Highly configurable report generation with ability to document justifications for each finding

Streamlines internal code review process by removing debate on naming and syntactic decisions

Measure Your Code

Automate software quality processes through automatic metric calculations, including:

- Cyclomatic complexity

- Comment Density

- Number of return statements

- And many more

Add user defined alarm thresholds for key metrics to further streamline code review process

Expanding Software Development Environments

One Toolchain, Many Targets

Toolchain	Raptor®		
Compiler	HIGHTEC For TriCore	HIGHTEC For Power Architecture GCC	GCC
OS	ETAS	ETAS	
Targets	CCM112	RCM112	

But, Why Only One Toolchain

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	Raptor	CODESYS · Pictorus · The Rust Programming Language		Expanding the ways in which customers can interact with New Eagle hardware
Toolchain				
Compiler	HIGHTEC For TriCore	HIGHTEC For Power Architecture	GCC	GCC
OS	ETAS	ETAS		
Targets	CCM112	RCM112		

Announcing CODESYS v3 Support On New Eagle ECUs

CODESYS will be progressively supported on all ECUs based on Infineon TriCore

Ideal for companies developing in IEC programming languages or with relatively basic control problems to solve

- Supports ladder logic, structured text, and other IEC 61131-3 formats
- Eliminates need for commercial compiler licenses (i.e. $0 compiler cost)
- CODESYS IDE fully integrates the ability to develop, build, and download code, as well as acquire data and calibrate parameters at run-time
- Download and debug via ethernet available on supported targets
- CODESYS license included in the purchase price of the ECU (i.e. $0 incremental toolchain cost)

New Eagle's implementation supports CANopen master & slave protocols, as well as J1939.
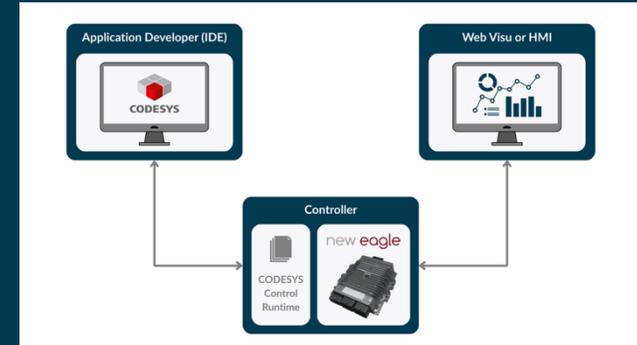
CODESYS Support Coming To All Of These Great ECU Platforms In the Coming Months
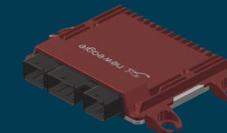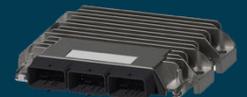
GCM44   GCM56   GCM111   GCM112

GCM106   *Already Available As A CODESYS ECU Today!*   CCM112   GCM108

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Pictorus Support Is Coming to Select New Eagle ECUs

Pictorus is a model-based design tool that generates Rust code instead of C

Support for Rust code generation has potential to accelerate the development of safety critical systems

- Rust compiler includes a static analyzer to detect runtime defects

- Rust offers streamlined memory safety

- Rust offers built-in support for concurrency management

The Pictorus environment offers intuitive model-based development accessible directly from your browser

- Mix and match models with handwritten Rust and/or C/C++ code

- Develop in both state driven or data flow architectures

And Now, target your Pictorus code directly to a New Eagle ECU, as if it were a Raptor target

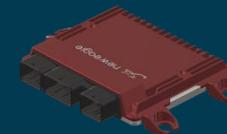- Support enabled through HighTec LLVM Toolchain for TriCore
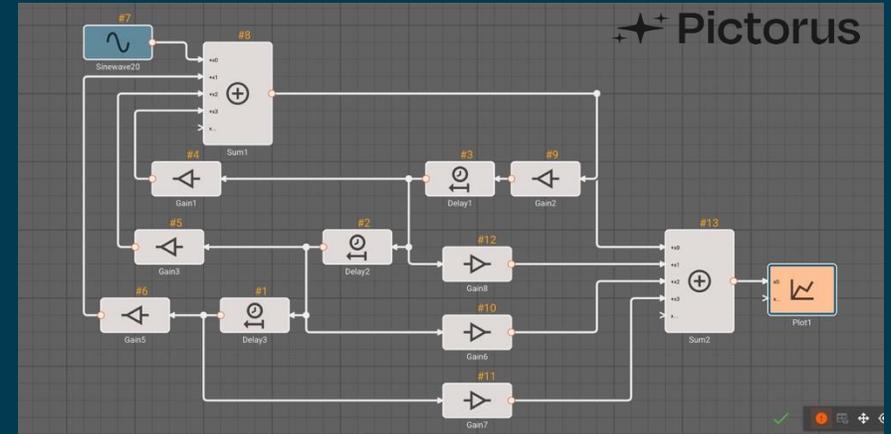
Pictorus Support Coming To All Of These Great ECU Platforms In the Coming Months

Beta Available In Pictorus Today

GCM111   CCM112   GCM56   GCM112

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Future Hardware Launches

John Deere VPU2

Available Now!

Key Functions & Applications

Key Functions:

- 1x Nvidia Orin AGX (12x ARM)
- 4x CAN2.0
- 1x 100base-T1 Ethernet
- 1x 10G Base-T Ethernet
- 12x GMSL2 Power Over Coax
- 12x GMSL2 6Gbps Camera
- 1 TB Internal SSD
- 64GB LPDDR4 RAM
- 64GB eMMC Flash

Key Applications:

- Advanced Vision Systems
- High-End Compute

Advanced Capabilities

High Performance Compute
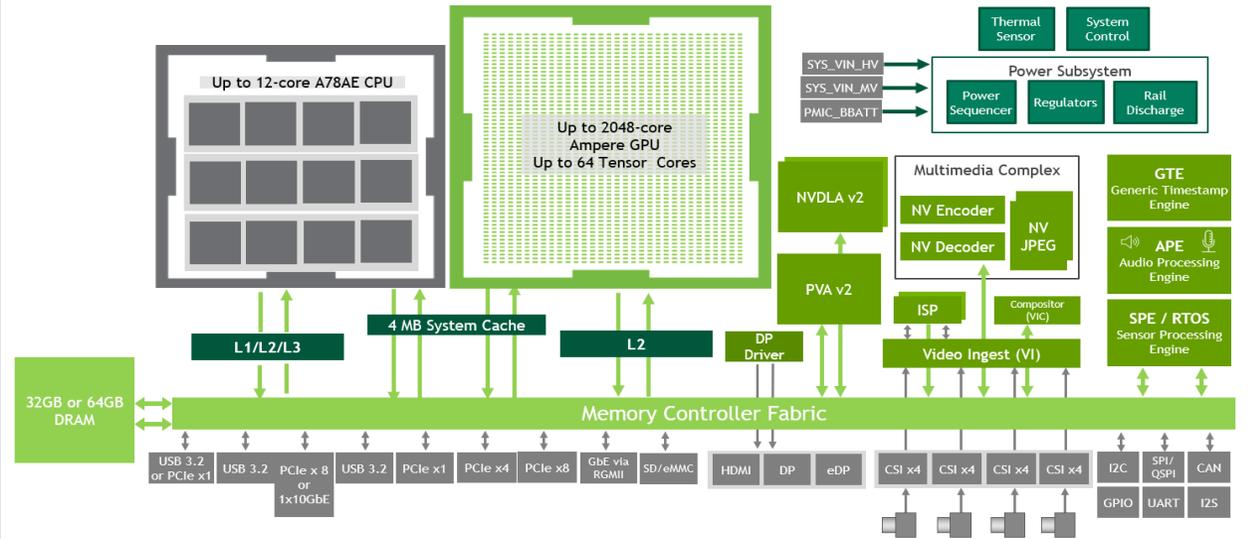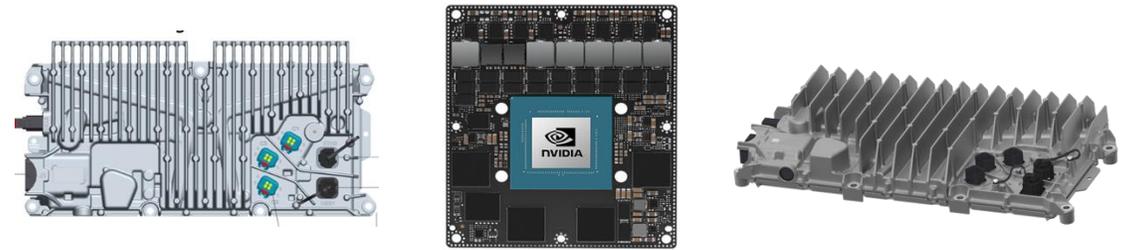
- 12x 2.2GHz ARM A78AE
- 2048x 1.3GHz Core GPU
- 64x 1.3GHz Tensor Cores

Cybersecurity Support

- Nvidia OPTEE

Environmental Features

- IP66/67
- -25C to +50C operational temperature range

VPU Roadmap

Available H2 2026

"VPU Medium"

Key Functions:
- 1x Nvidia Orin NX + AMD ZU7
- 3x CAN
- 1x 100base-T1 Ethernet
- 1x 5G Base-T Ethernet
- 8x camera inputs
- 256GB Internal SSD
- 16GB LPDDR4 RAM

Available Now For Prototyping

"VPU Lite"

Key Functions:
- 1x AMD ZU7
- 2x CAN
- 1x 1000base-T1 Ethernet
- 1x 100base-T1 Ethernet
- 4x camera inputs
- 32GB eMMC Flash
- 4GB LPDDR4 RAM

Software Enablement

Linux SDK available initially, able to support the following additional workflows:
- Soft PLC capability through installation of CODESYS
- Ability to develop in Matlab/Simulink including GPU Coder
- Ability to develop in C, C++, Rust, etc

Raptor support will trail hardware availability by 6-9 months

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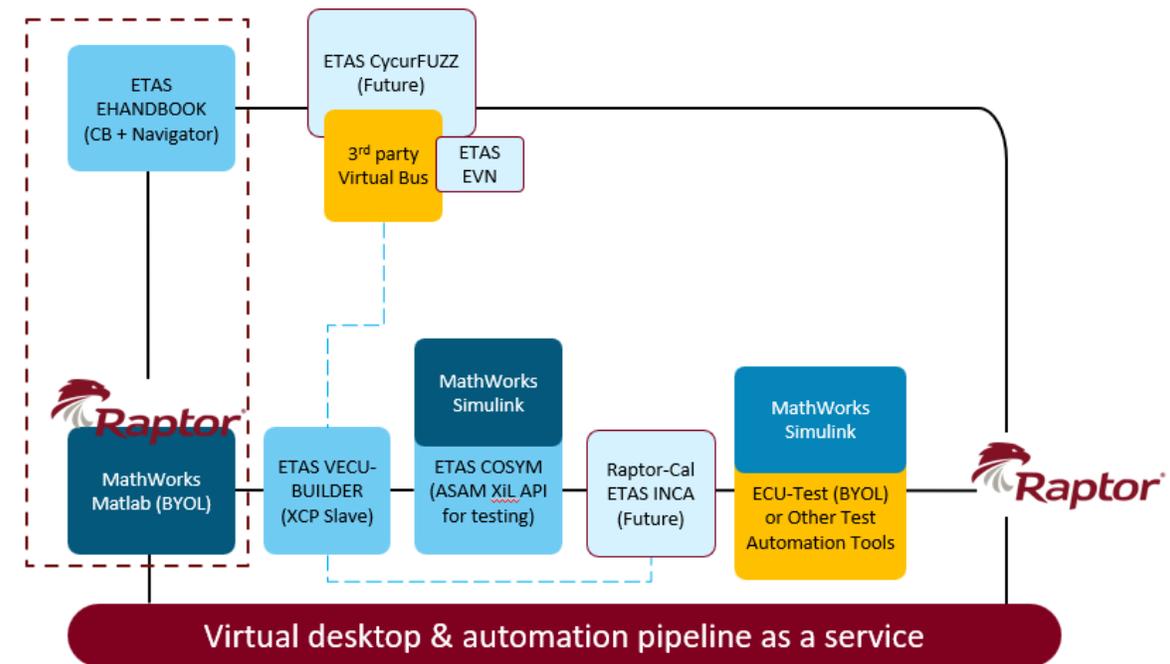# What's Next

Raptor Cloud Update

Initial Support in Raptor 2025b

Raptor Cloud tooling streamlines your development workflow throughout "the V"

Built around a core set of tooling developed by ETAS and available through New Eagle for use within a cloud-based workflow

- Develop your code in Raptor, Matlab/Simulink, ASCET, or C

- Create virtual ECUs of varying fidelity to exercise your software in new ways, even before hardware is available

- Automatically generate living documentation leveraging ETAS eHANDBOOK

- Support multiple workflows with a common set of tooling: Virtual HIL, Virtual Integration Testing, and CI/CD Pipelines.

Combining Raptor Cloud with Raptor-Dev unlocks the ability to create virtual ECUs directly from Raptor with "single button build" efficiency

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