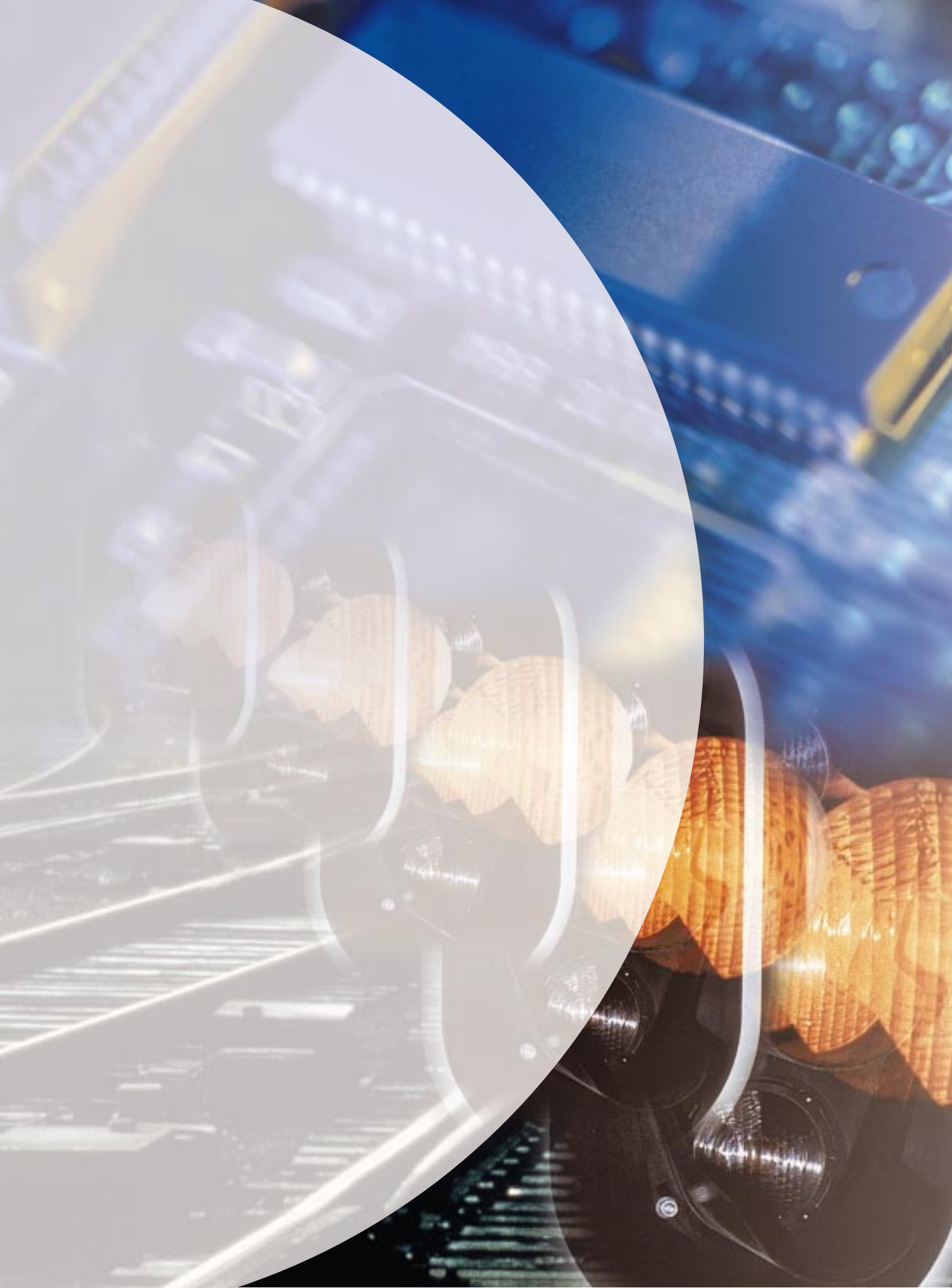




SMARTLOCK™

World Standard Interlocking Technology
for all rail applications

ALSTOM





ALSTOM Signaling Range of products

The range of ALSTOM Signaling products covers mainline and mass transit business.

In the field of mainline railways, ALSTOM offers a global solution (**ATLAS**) for the highest densities of operation, including high speed lines, inter-city and regional lines, as well as for low-density lines, freight railroads and single-track operations.

For mass transit ALSTOM offers a global solution (**URBALIS**) for heavy metro and suburban networks, as well as for light rail systems.

These solutions are modular, adaptable and designed to be upgradable to closely follow the evolution of railway requirements.

To meet these requirements ALSTOM has developed 4 categories of products :

SMARTWAY Conventional Signaling Products, also simply called "Signaling Products" covering all basic needs in the following fields :

- train detection, i.e. track circuits, axle counters, wheel detection etc.
- point equipment, point (switch) machines, locking devices, blade controllers
- level (grade) crossing equipment
- signals
- relays and accessories
- miscellaneous

SMARTLOCK offers a range of solutions based on electronic devices and/or relays to ensure the safe locking of routes and all the traditional functions of an interlocking system.

ADVANTIK Automatic Train Control (ATC) systems dedicated to mainline railways operation.

MASTRIA Automatic Train Control (ATC) systems dedicated to mass transit operation, including Automatic Train Protection, Automatic Train Operation, and all associates facilities.

The ATC system can also be fully integrated with Interlocking and Train Supervision functions.

ICONIS Automatic Train Supervision (ATS), also called Integrated Electronic Control System, integrating all activities required for train control, train supervision or monitoring, management functions, SCADA requirements, maintenance or alarm centralization and supervision etc.

The following documentation covers the whole range of ALSTOM Interlocking SMARTLOCK.



SMARTLOCK is the new product in the ALSTOM interlocking range (ASCV, VPI, SSI, CMT). Based on ASCV kernel and tools, it takes advantage of the most recent technologies and integrates the best features of VPI and SSI to provide customers the best value at minimal cost.

A guaranteed investment for the future

SMARTLOCK is a new family of interlocking with enhanced life cycle and migration capability. Its modular nature ensures enables the customers future upgrades at minimum cost.

Special features include:

- high functional modularity: each module can be replaced and upgraded without requiring any modification of the adjacent modules
- safety of calculation kernel and network independent from the hardware and from the medium of communication
- use of standard multi-sourced components and bus system
- secured source of components by sharing the technical choices of major electronics players: army and telecom

By acquiring a SMARTLOCK electronic interlocking the customers will receive the best support from a world leader in signaling.

Easy to interface

SMARTLOCK can be easily interfaced with other subsystems like Automatic Train Control or Automatic Train Supervision thanks to efficient serial links:

- standard interfaces: RS 232, V24-28, V3, etc.
- standard protocols: TCP-IP, HDLC, BSC
- use of commercial off the shelf communication equipment

To interface with the field equipment SMARTLOCK offers a wide range of remote and centralized activators.

When the field equipment needs no change, SMARTLOCK can be simply plug in your relay interface. If remote equipment needs to be controlled, the customer may wish to use remote I/Os or a mix architecture to reduce cable cost.

Easy to use

Several Man Machine Interface solutions are provided to meet operational needs:

- Remote or local control
- Safe terminal with functional keyboard
- High quality terminal and schematic display

The Man Machine Interfaces use open architecture based on an Ethernet Network. They are all programmed in object oriented languages that make the customisation to specific needs easy and efficient.



The value of real-time diagnostic tools

Maintenability and Maintenance

All diagnostic tools run on a standard PC connected on Ethernet network. Depending on the needs, it can be local and/or remote.

Massive investment has enabled Alstom to provide its customers with high quality tools:

- Full graphical interface
- Diagnostic of the interlocking equipment
- Easy fault location: with simple clicks on the screen the maintainer will zoom from the field lay-out to building, rack and finally to the faulty-card or cable.
- Easy maintenance procedure: the "hyper-text on-line help" allows easy retrieval of information and documentation related to the specific context of the maintenance operation (procedures, manuals, drawings, etc.)
- Preventive diagnostic of field equipment (signals, points, track-circuits, etc.)



All the maintenance facilities are accessible remotely from any point in the world with the required level of integrity through standard PC technology. Several layers of maintenance expertise can easily be defined with, for instance, the most knowledgeable maintainers able to take the control over local maintenance in case of complex problems. For customers who wish, Alstom can even assure the role of the most knowledgeable maintainer during the training period.

The highest standards of safety

SMARTLOCK achieves the highest standards of safety in the Railway industry.

Based on NISAL (Numerically integrated Safety Assurance Logic) technology, already used in more than 400 interlocking systems in the world, SMARTLOCK demonstrates SIL 4.

Its safety case is fully compliant with CENELEC standards.

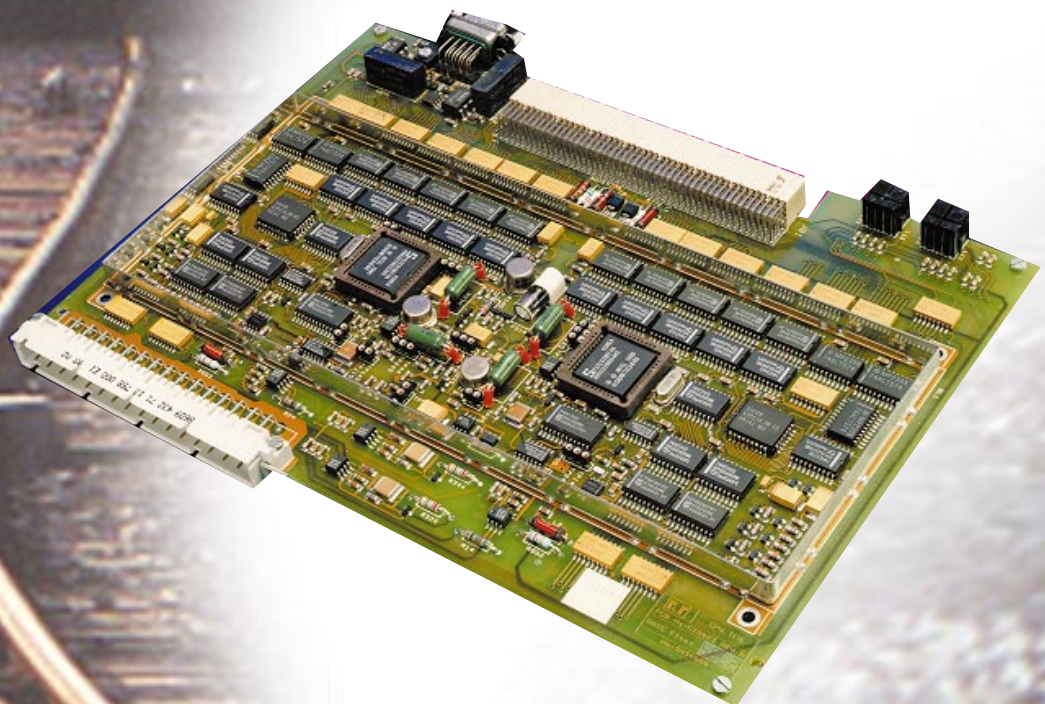
High performances

SMARTLOCK will meet the highest requirements in terms of calculation and response time thanks to its:

- powerful calculation kernel based on a State-of-the-art micro-processor
- cycle time of 500ms (reading of inputs + calculation + setting of the outputs)

Its (optional) hot stand-by system gives a very high availability:

- Switch over-time in less than 30 ms
- No impact on operation:
 - points can continue to be moved
 - route change possible
 - no flashing signals
 - no effect at MMI level



Easy to implement and modify

Easy to implement and modify

A comprehensive set of tools enables the customer to easily modify and test the logic of his interlocking.

The customer can even enter its own signalling rules in a traditional relay type representation. No specialist computer knowledge is required.

Once these signalling rules are introduced, the logic data of the different applications are produced automatically from the track layout in a CAD format. A complete set of testing tools are then provided to test the logic in a user friendly environment.

If it is required to add a loop or a signal, all that is necessary to do is to introduce the modification in the CAD lay-out and, of course, test the final result.

With SMARTLOCK, you keep the process and the cost of modifications under your control.



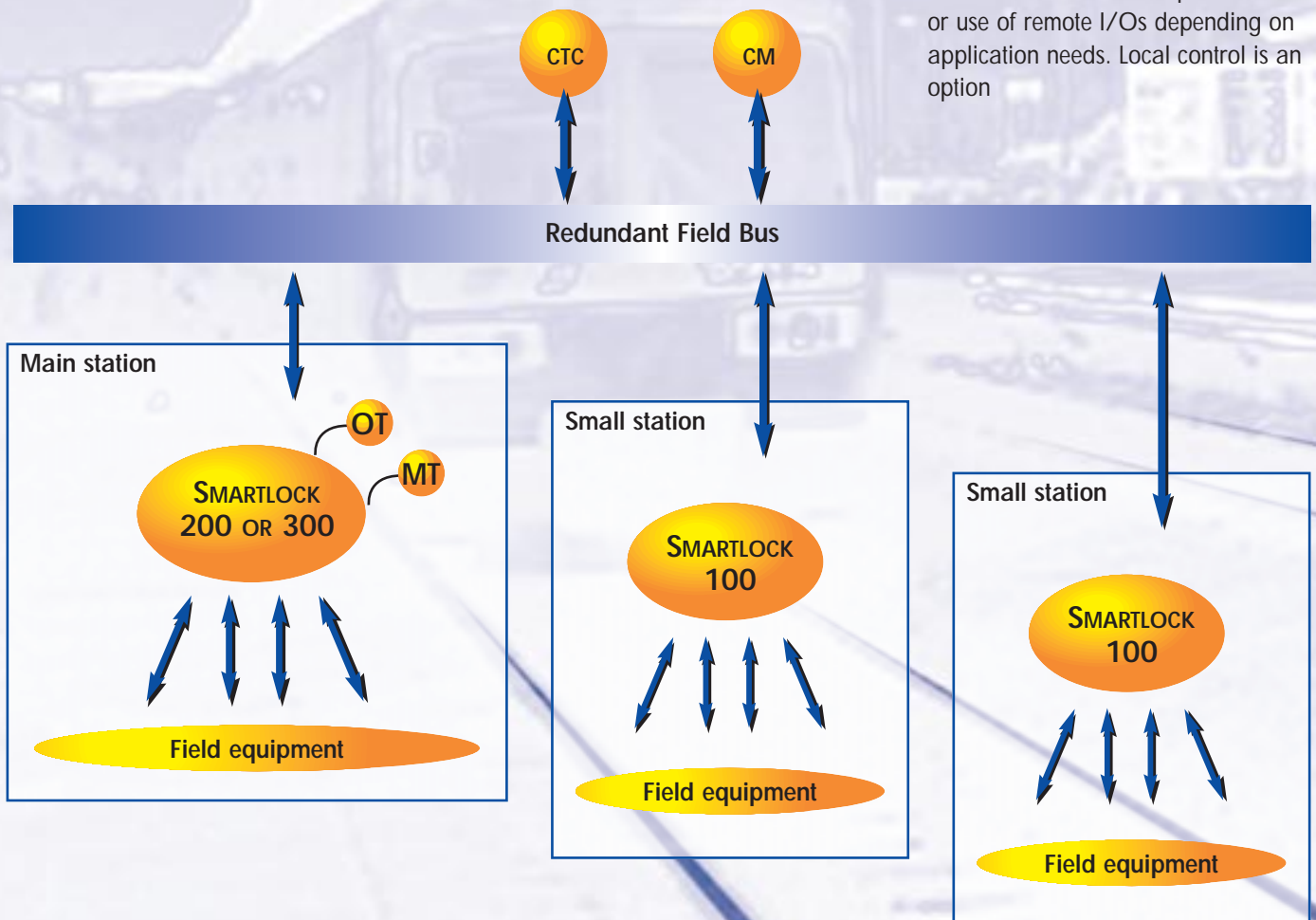
SMARTLOCK Main lines for complete lines



The SMARTLOCK Main lines is a complete solution for the interlocking function of a full line.

It uses the following elements:

- One or several SMARTLOCK in the main station linked by an optical fail-safe bus @2Mb/s or any media available radio, PCM, etc.
- Centralised MMI and maintenance in the main station
- Fail-safe bus based on available media (optic fibre, PCM, etc.) to link all the stations
- One small SMARTLOCK per station or use of remote I/Os depending on application needs. Local control is an option

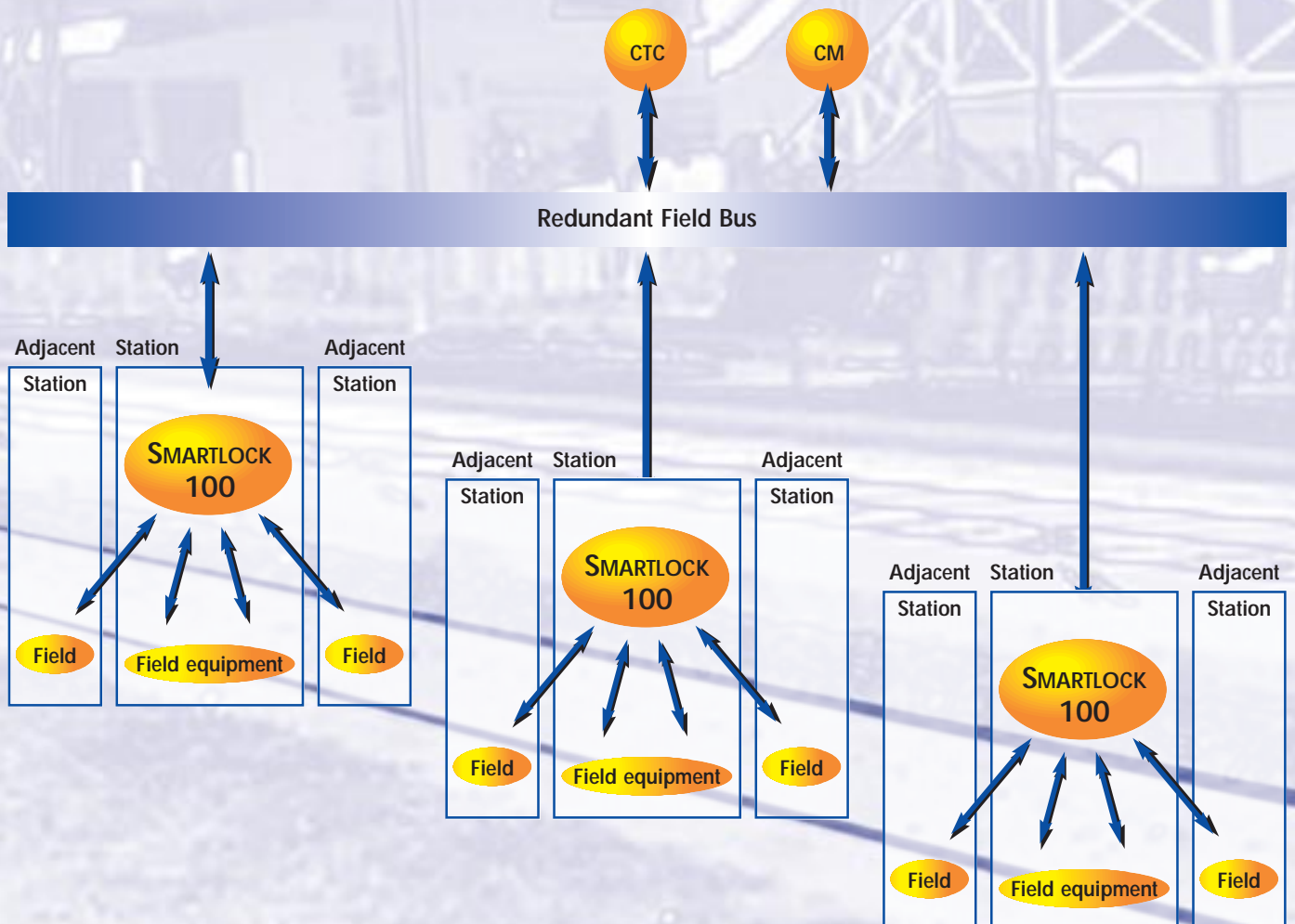


SMARTLOCK Transit for mass transit applications

The **SMARTLOCK Transit** is the standard interlocking for metro applications.

The basic architecture is:

- One SMARTLOCK for one or several stations
- Use of remote I/O as an option
- An optical fail-safe bus @ 2 MB/S
- Local or/and remote control
- Standard links with CTC and centralised maintenance



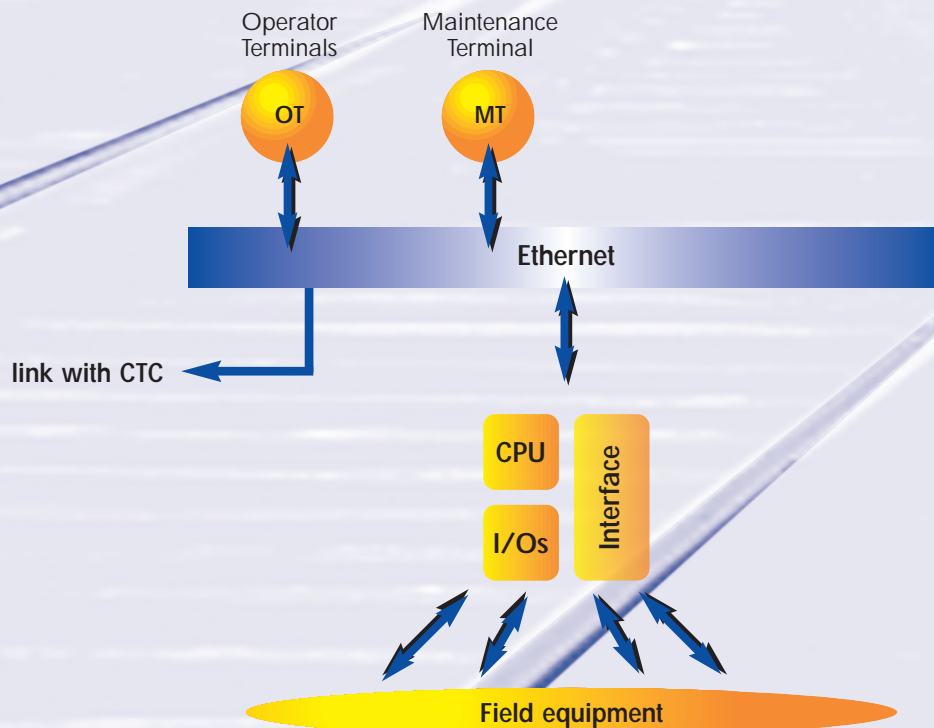
SMARTLOCK 100 for small configuration

The **SMARTLOCK 100** system is a cost effective solution for small configuration with up to 30 routes.

It uses the following elements:

- A local operator and maintenance interface
- One SMARTLOCK (normal or redundant) comprising:
 - One calculation kernel (in I/O cubicle)
 - One cubicle for I/Os
 - One cubicle for interfaces

Optional remote maintenance and operators can be provided to take the control centrally during certain periods of the day or under special circumstances.



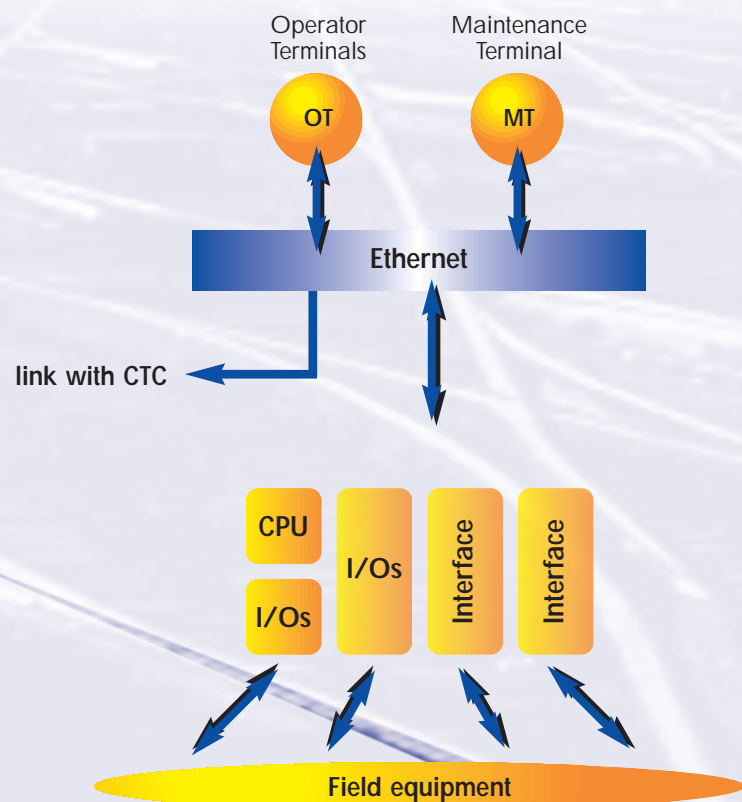
SMARTLOCK 200 for medium configuration

The **SMARTLOCK 200** system is an extension of SMARTLOCK 100 for medium configuration with up to 100 routes.

It uses the following elements:

- A local operator and maintenance interface
- One redundant SMARTLOCK comprising:
 - One calculation kernel (in I/O cubicle)
 - Two cubicles for I/Os
 - Two cubicles for interfaces
- Optional interface with TFMs network (remote I/Os)

Optional remote maintenance and operators can be provided to take the control centrally during certain periods of the day or under special circumstances.



SMARTLOCK 300 for Large configuration



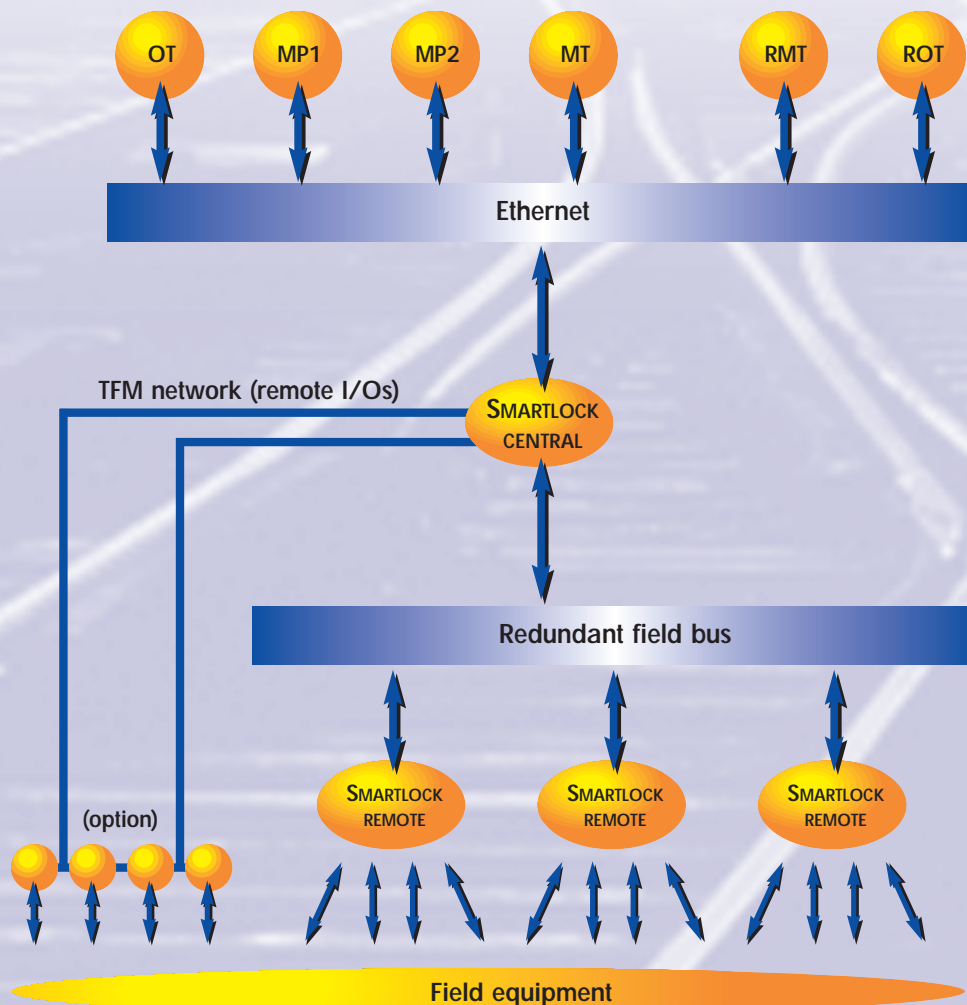
The **SMARTLOCK 300** system provides the interlocking solution for large configuration over 100 routes.

It is based on the following architecture:

- A standard Ethernet network linking all the operator and maintenance MMI
- One SMARTLOCK Central in charge of all the logic calculation
- A redundant fail-safe field bus @2Mb/s

- Several SMARTLOCKS remote in charge of the communication and of the actuation of field equipment
- Optional interface with TFMs network (remote I/Os) inherited from SSI technology.

This configuration ensures the best response time and availability for stations of several hundreds of signals and points.



ALSTOM Interlocking Equipments

RAILWAYS	MASS TRANSIT	EQUIPMENT
	AMSTERDAM	6
	ATLANTA	5
AUSTRALIA		80
BELGIUM		92
BOTSWANA		3
CANADA		295
	CHICAGO	32
CHINA		12
FRANCE		8
	GLASGOW	1
GREECE		33
	HONG KONG	34
INDONESIA		77
IRELAND		30
ITALY		73
KOREA		70
	LONDON	1
MOROCCO		31
	MORRISTON	1
NETHERLANDS		59
	PHILADELPHIA	17
	SHANGHAI	8
	SINGAPORE	17
SOUTH AFRICA		1
SPAIN		2
SRI LANKA		11
SWITZERLAND		1
TAIWAN		11
	TAIWAN	59
THAILAND		1
UK		139
USA		261
WASHINGTON-DC	WASHINGTON-DC	2

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