RECOMMENDATION ITU-R M.1451

TRANSPORT INFORMATION AND CONTROL SYSTEMS: FUNCTIONALITIES

(Question ITU-R 205/8)

(2000)

The ITU Radiocommunication Assembly,

considering

a) that transport information and control systems (TICS) may significantly contribute to the improvement of public safety;

b) that international standards would facilitate worldwide applications of TICS and provide for economies of scale in bringing TICS equipment and services to the public;

c) that early international harmonization of TICS would have several benefits;

d) that worldwide compatibility of TICS may be dependent on common radio spectrum allocations;

e) that the International Organization for Standardization (ISO) has work under way on standardizing TICS (non-radio aspects) in ISO/TC204 which will contribute to the efforts in ITU-R,

noting

a) that the RF objectives and requirements of TICS elements are defined in Recommendation ITU-R M.1310,

recommends

that TICS intended for worldwide and/or regional use should meet the following functional requirements:

1 TICS functions

The functions below are intended to provide a preliminary framework for the definition of TICS functions.

1.1 Advanced vehicle control systems

– Monitoring vehicle status including vehicle operations and roadside conditions.

– Providing automatic vehicle operations including automatic cruise control.

– Providing automatic emergency notification and incident detection.

– Enhancing driver's vision.

1.2 Advanced traffic management systems

– Providing traffic monitoring and surveillance including travel demand management and the exchange of information between traffic management centres.

– Providing device control including the remote control of such devices.

– Providing incident management and generating appropriate responses.

– Monitoring vehicle emissions.

1.3 Advanced traveller information systems

– Providing trip planning, guidance and information services including yellow page services.
– Providing traveller services at information kiosks.
– Managing rideshares.
– Value-added traveller information services including e-mail, short message (SMS), paging, and Internet.

1.4 Advanced public transportation systems

– Monitoring and disseminating information on vehicle operation and schedule adherence.
– Planning and scheduling transit services, including vehicle maintenance schedules.
– Providing transit user roadside facilities.

1.5 Advanced fleet management systems

– Managing commercial vehicle fleet operations, as well as driver operations.
– Providing roadside check facilities.
– Administering electronic credentials for cargo data/contents and border clearance.

1.6 Emergency management systems

– Allocating emergency services in response to requests.
– Providing operator interface for emergency data.
– Providing emergency service map data.

1.7 Electronic payment services

– Providing electronic toll payment.
– Providing electronic parking payment.
– Providing electronic fare collection.
– Carrying out centralized payments processing.
– Providing payment instrument interfaces.

2 Relationship of TICS functions to suitable RF options

2.1 Advanced vehicle control systems

TICS functions	RF options						
	Longitudinal collision avoidance	Lateral collision avoidance	Intersection collision avoidance	Vision enhancement systems	Pre-crash restraint deployment	Automated road systems	Safety readiness
Monitor vehicle status	– Short range vehicle-to-vehicle – Short range radar – LCX	– Short range vehicle-to-vehicle – Short range radar – LCX	– Short range vehicle-to-vehicle – LCX – DSRC	– Short range radar	– Short range radar	– Short range vehicle-to-vehicle – Short range radar – LCX – DSRC	– LCX – DSRC
Provide automatic vehicle operations	– Short range vehicle-to-vehicle – Short range radar – LCX	– Short range vehicle-to-vehicle – Short range radar – LCX	– Short range vehicle-to-vehicle – Short range radar – LCX – DSRC	– Short range radar – LCX	– Short range radar	– Short range vehicle-to-vehicle – Short range radar – LCX – DSRC	– DSRC
Provide automatic emergency notification and incident detection	– Wide area – LCX		– Wide area	– LCX		– Wide area – LCX	– LCX
Enhance driver's vision	– Short range vehicle-to-vehicle – Short range radar	– Short range vehicle-to-vehicle – Short range radar	– Wide area – DSRC	– Short range radar	– Short range radar	– LCX – DSRC	– Short range radar

LCX: leaky coaxial

DSRC: dedicated short-range communications

2.2 Advanced traffic management systems

TICS functions	RF options				
	Traffic network monitoring and control	Travel demand management	Incident detection and management	Emission testing and mitigation	Parking management
Provide traffic monitoring and surveillance	– Microwave – Radar	– Microwave	– Radar – Two-way mobile-to-base – LCX	– Microwave	– DSRC – Microwave
Provide device control	– Microwave	– Microwave	– Two-way mobile-to-base – LCX	– Microwave	– Broadcast – DSRC – Two-way mobile-to-base
Provide incident management and generate appropriate responses	– Microwave	– DSRC – Microwave – Two-way mobile-to-base	– Two-way mobile-to-base – LCX	– Microwave	– Broadcast – DSRC
Monitor vehicle emission	– Microwave	– DSRC – Microwave – Two-way mobile-to-base	– Two-way mobile-to-base – LCX	– DSRC – Two-way mobile-to-base – LCX	– DSRC – Two-way mobile-to-base

2.3 Advanced traveller information systems

TICS functions	RF options				
	Pre-trip travel information	En-route driver information	En-route transit information	Route guidance	Ride matching and reservation
Provide trip planning, guidance and information services	– Broadcast – Two-way mobile-to-base – DSRC – LCX	– Broadcast – Two-way mobile-to-base – DSRC – LCX	– Broadcast – Two-way mobile-to-base – DSRC – LCX	– Broadcast – Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base
Provide traveller services at information kiosks	– Broadcast – Two-way mobile-to-base	– Broadcast – Two-way mobile-to-base	– Broadcast – Two-way mobile-to-base		– Two-way mobile-to-base
Managing rideshares					– Two-way mobile-to-base
Value-added traveller information services (e-mail, SMS, paging, Internet, etc.)	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base – DSRC – LCX

2.4 Advanced public transportation systems

TICS functions	RF options	
	Public transportation management	Personalized public transportation
Monitor and disseminate information on vehicle operation and schedule adherence	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base
Plan and schedule transit services, including vehicle maintenance schedules	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base
Providing transit user roadside facilities	– Two-way mobile-to-base – DSRC – LCX	– Two-way mobile-to-base – DSRC

2.5 Advanced fleet management systems

TICS functions	RF options					
	Vehicle administration	Safety monitoring and tracking	Fleet management	Vehicle pre-clearance	Automated roadside safety inspections	Hazardous material incident response
Manage commercial vehicle fleet operations, as well as driver operations	– Two-way mobile-to-base	– Two-way mobile-to-base – DSRC	– Two-way mobile-to-base – DSRC	– DSRC	– DSRC	– Two-way mobile-to-base
Provide roadside check facilities	– DSRC	– DSRC	– DSRC	– DSRC	– DSRC	– DSRC
Administer electronic credentials for cargo data/contents and border clearance	– Two-way mobile-to-base	– Two-way mobile-to-base – DSRC	– Two-way mobile-to-base – DSRC	– DSRC	– DSRC	– Two-way mobile-to-base
Manage special permitted vehicles	– Two-way mobile-to-base – DSRC	– Two-way mobile-to-base – DSRC	– Two-way mobile-to-base – DSRC	– DSRC	– DSRC – LCX	– Two-way mobile-to-base
Manage effective road network administration	– Two-way mobile-to-base – DSRC	– Two-way mobile-to-base	– Two-way mobile-to-base		– DSRC – LCX	– Two-way mobile-to-base – Wide area – Broadcast – LCX

2.6 Emergency management systems

TICS functions	RF options		
	Emergency notification and personal security	Public travel security	Emergency vehicle management
Allocate emergency services in response to requests	– Two-way mobile-to-base	– Two-way mobile-to-base	– Two-way mobile-to-base – Two-way mobile-to-mobile
Provide operator interface for emergency data			
Provide emergency service map data			– Two-way mobile-to-base – Two-way mobile-to-mobile
Manage effective road network administration	– Two-way mobile-to-base – Wide area – Broadcast – LCX	– Two-way mobile-to-base – Wide area – Broadcast – DSRC	– Two-way mobile-to-base – Two-way mobile-to-mobile – LCX
Manage special permitted vehicles	– Two-way mobile-to-base – Wide area – Broadcast	– Two-way mobile-to-base – LCX	– Two-way mobile-to-base – LCX

2.7 Electronic payment services

TICS functions	RF options
	Electronic payment services
Provide electronic toll payment	– Two-way mobile-to-base – DSRC
Provide electronic parking payment	– Two-way mobile-to-base – DSRC
Provide electronic fare collection	– Two-way mobile-to-base – DSRC
Carry out centralized payments processing	– Two-way mobile-to-base
Provide payment instrument interface	– Two-way mobile-to-base