Tiesse
Innovation made in Italy®

Imola LX
Router series

Imola LX 0296

EVDSL
6 ax
GE
SFP 2.5
SFP+ 10

Datasheet

WWW.TIESSE.COM

Imola LX 0296

Ultra-broadband router
Fiber, xDSL, Wi-Fi 6

IMOLA LX xx96 SERIES

The Imola LX xx96 series routers are state-of-the-art all-in-one routers, equipped with GE/Fibre connectivity up to 10Gbits and Wi-Fi 6 for FTTC, FTTH and FTTO profiles.

The different product models differ in the presence or absence of certain connectivity (xDSL, Voice, 4G, 5G).

ALL-IN-ONE

FTTC, FTTH and, FWA in a single device for reliable, versatile and scalable connectivity. Our Imola LX series devices are adaptable to any technology and include the features

- Routing & switching
- Multi fail-over
- QoS

KEY FACTORS

Secure by design
Right from the design phase for robust and natively secure solutions.

Always-On
Stable connections anywhere, with multiple links, transparent backup, and quality of service for uninterrupted business.

Smart value
Maximizes business value with an excellent performance-to-price ratio.

Factory pre-configurations
Receive your product pre-configured according to your specific case.

100% factory-tested
We test all our equipment.

Zero Touch Provisioning
For remote management and agile configuration of the installed base, with Tiesse's TNA suite.

Imola LX 0296

4 Gigabit Ethernet ports

1 eVDSL port

2 fiber ports up to 10GB

Wi-Fi 6 AX

Zero Touch Provisioning

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SUGGESTED SCENARIOS AND APPLICATIONS

ISP & Telco Ready
Designed to meet the requirements of service providers, telecom operators, carriers, and system integrators.

Backup and redundancy on multiple links
Optimised products for ultra-connected branches and remote locations

Service continuity and Mission Critical applications
Business applications requiring always-on links, network performance and quality of service

BACKUP: high availability mission critical

Seamless backup

The user does not perceive service interruptions and the transition to backup.

Transitions from normal to backup mode and vice versa are performed considering the operational costs.

Multiple Backup

A pair of routers in VRRP performs physical backup of both the network and the hardware.

Homogeneous Backup

A single router integrates all ports, wired and mobile.

Heterogeneous backup

An installed base can be upgraded by adding a mobile router and using the VRRP (Virtual Router Redundancy Protocol).

SYSTEM FEATURES

PROCESSOR	Quadcore 2.2 GHz
MEMORY	512 MB
FLASH MEMORY	256 MB

CHASSIS	Plastic material, black color
FORM FACTOR	Desktop
	Rack 2 U (optional kit)

HARDWARE INTERFACES

Ports	N°	Description	Details
LAN / WAN	4	**GE**	10/100/1000 Mbps ports
	2	**SFP/SFP+**	1G / 2.5 / 10 Gbit ports, via SFP/SFP+ cages (transceiver module not included)
Wi-Fi	1	**RF**	IEEE 802.11ax IEEE 802.11ac IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11a
		Bands	2.4 GHz and 5 GHz simultaneous
		MIMO	4 x 4
		Antennas	External removable antenna, SMA male connectors
ADSL2/2+ **VDSL2** **eVDSL**	1	**ADSL2/2+**	– Downstream data rates up to 24 Mbps - Upstream data rates up to 3.5 Mbps – Compliant with Standard G.992.1 annex A,B,C&I, G.992.2-g.Lite, – G.992 .3 annex A, B, I, J, M, G.992 .4-g.Lite.bis, G.992.5 annex A, B, C, I, J, M, ANSI T1.413 issue2, ETSI TS 388 ADSL-over-ISDN, ITU T-I361, ITU T-I.363.5, ITU T-I.432, ITU T-I610, ITU T-I731
		VDSL2	– Support for all VDSL2 profiles: 8 MHz up to 30 MHz ITU-T G993.2 – Compliant with G.Vector standard (ITU-T G.993.5) – Compliant with ITU-T G.998.4 G.INP standard – Compatible with ADSL2 (backward compatibility)
		eVDSL	– 35 MHz ITU-T G993.2 Annex Q profile support (35b or Vplus profiles) with aggregate rates up to 400Mbps

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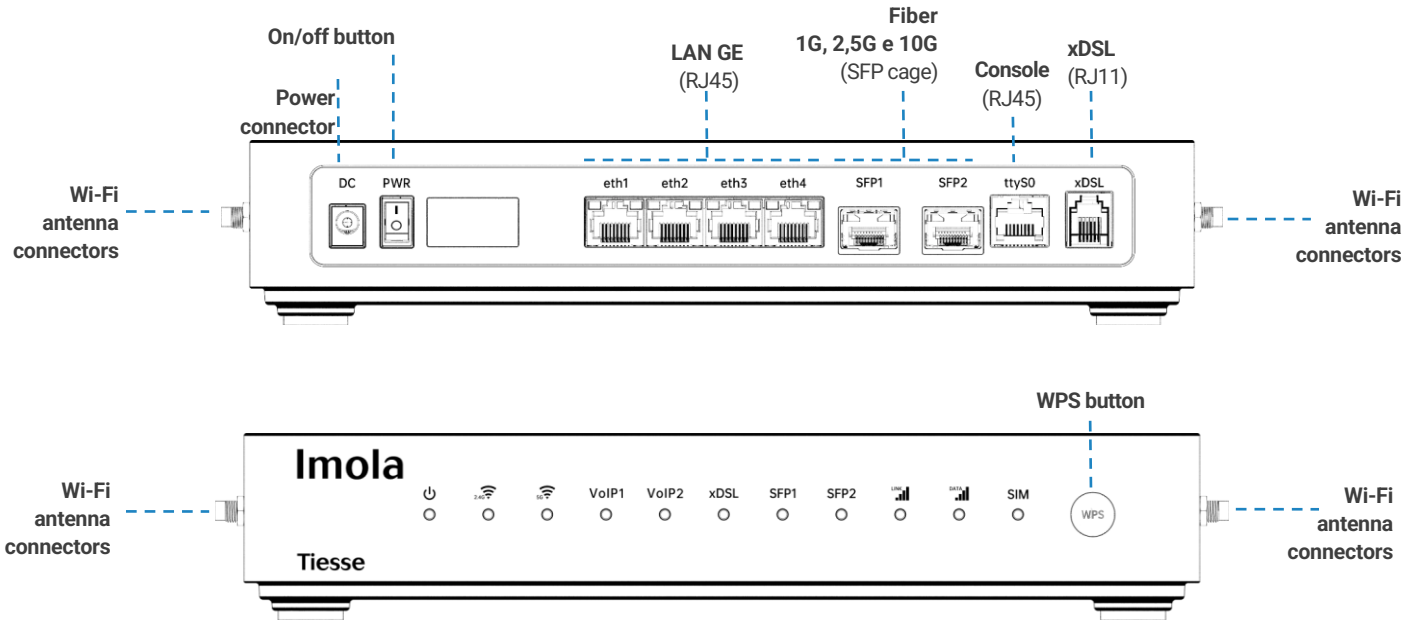
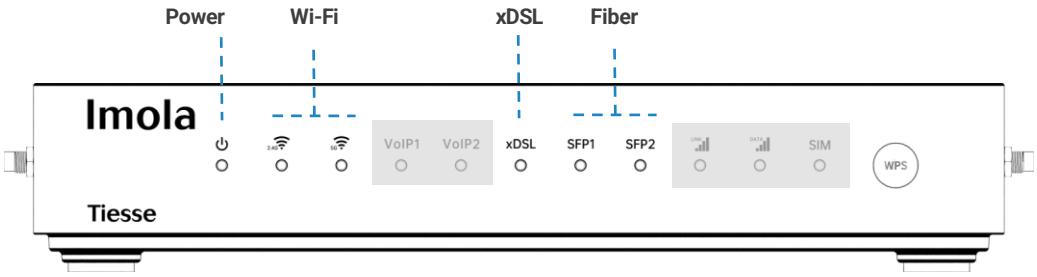
HARDWARE INTERFACES



LED DESCRIPTION



* NOTE: The use of LEDs depends on the active functionality of each specific model. The figure above shows the LEDs used in the models covered by this datasheet.

LED		Color	Description
Power	⏻	**Green**	router power operational status
Wi-Fi	2.4G	**Green**	Wi-Fi connection status 2.4 GHz band
	5G	**Green**	Wi-Fi connection status 5 GHz band
xDSL	xDSL	**Green**	xDSL connection operating status
Fiber	SFP1	**Green**	fibre connection operational status for SFP1 port
	SFP2	**Green**	fibre connection operational status for SFP2 port
ETH		**Yellow/Green**	for each ETH port, indicate operational status (green 1000 Mbps - yellow 10/100 Mbps)

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FUNZIONALITA' DI MONITORING E MISURAZIONE DELLE PERFORMANCE

Supporto IP SLA / Active Probing per misure di qualità	Misura attiva della qualità del link mediante pacchetti di test	Raccolta dati e supervisione tramite
- One-Way Delay - Round-Trip Delay - Jitter - Packet Loss	- BFD – Rilevazione rapida di fault di connettività - ICMP Echo / Ping – RTT e reachability - UDP/TCP Probe – Verifica con protocolli di trasporto reali - HTTPS Probe – Controllo disponibilità servizi applicativi - TWAMP/OWAMP – Misura standardizzata di delay, jitter e loss	- SNMPv2/v3 – Polling e trap di stato - Syslog – Log eventi di sistema e allarmi - NetFlow / IPFIX – Analisi dei flussi di traffico - TNA MOS Tiesse

SOFTWARE

Nota: la lista seguente è puramente indicativa, le funzionalità attive dipendono dalla versione e dall'aggiornamento software (NOS).

NETWORKING

- IPv4 / IPv6 Dual Stack advanced forwarding, filtering e dual-stack policies
- VXLAN (RFC 7348): L2 over IP/UDP con VNI encapsulation per-tenant
- Supporto SRv6 Native SID:
  - Implements End, End.X, End.DT6, End.B6 behaviors
  - Integrato con BGP SR Policy per flexible traffic engineering
- Alta disponibilità: ECMP, VRRP, BFD, convergenza veloce tramite EVPN multihoming

LAYER 2

- VLAN IEEE 802.1Q: supporto VLAN iTagged con trunk e porte di accesso configurabili
- Bridging Ethernet: domini bridge hardware/software con apprendimento e filtraggio MAC
- Layer 2 protocol Tunneling (L2TP)
- 802.1Q-in-802.1Q
- EVPN (RFC 7432):
  - L2/L3 VPN overlay over IP/MPLS
  - MAC/IP route advertisement (Type-2), IP Prefix routes (Type-5)
  - Ethernet Segment Identifier (ESI) per il multihoming e la ridondanza
- Spanning Tree Protocols (opzionale): supporto RSTP/MSTP
- Integrazione VXLAN + EVPN :
  - EVPN come piano di controllo per gli overlay VXLAN
  - Segmentazione dei tenant e mobilità MAC senza soluzione di continuità

ROUTING & MULTICAST

- BGP – Border Gateway Protocol:
  - Supporto completo IPv4/IPv6 con route-map, liste di prefissi, comunità
  - Route Reflector, Confederation, Add-Path, Route Refresh
  - BGP-LU per l'integrazione MPLS/SRv6
  - Estensioni BGP EVPN e SR-TE
  - RPKI per la validazione dell'origine delle rotte
- OSPF / IS-IS:
  - Supporto IGP dinamico per underlay routing
  - SRv6 SID advertisement via estensioni IGP
- RIP, RIPNG
- Routing statico con route distance e route tagging
- Ridistribuzione delle rotte
- Routing basato su policy
- Supporto VRF completo
- VRR (Virtual Routing Redundnacy Protocol)
- Routing multicast con PIMv2 sparse-mode e PIMv2 dense-mode, MSDP
- IGMP v1-v2-v3, IGMP snooping, IGMP Proxy
- Supporto MPLS
  - Native MPLS Forwarding
  - Supporto per LDP per la distribuzione di etichette
- Multihoming e Failover:
  - BGP multipath, BFD fast detection, graceful restart

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SOFTWARE

Nota: la lista seguente è puramente indicativa, le funzionalità attive dipendono dalla versione e dall'aggiornamento software (NOS).

QoS	- Classificazione del traffico in base all'IP di origine, all'IP di destinazione, ai protocolli (UDP, ICMP, TCP, ecc.) e alle porte, e alle loro combinazioni, al riconoscimento delle applicazioni, alla Precedenza IP e al DSCP - DiffServ - Remarking di Precedenza IP, DSCP e CoS - Shaping con allocazione di banda garantita e ridistribuzione della banda in eccesso - Committed Access Rate e Multicast rate limit - Meccanismi di prioritizzazione del traffico, definizione di un numero arbitrario di classi di priorità - Aggregazione di link IEEE 802.3ad

VPN e TUNNELLING	- IPSec VPN (site-to-site e remote-access):
	  - Supporto IKEv1/IKEv2.
	  - Policy-based e route-based IPSec.
	- GRE / GRE over IPsec:
	  - Simple L3 tunneling o incapsulamento sicuro
	  - NHRP (Next Hop Resolution Protocol) per DMVPN Architecture
	- L2TP / L2TPv3:
	  - Layer 2 VPN over IP
	  - Emulazione pseudowire opzionale con controllo statico o dinamico
	- Supporto OpenVPN client e server

SICUREZZA	- Access Control Lists (ACLs):
	  - IPv4/IPv6 L2-L4 filtering con azioni di autorizzazione/rifiuto
	  - Applicato su ingress/egress per interfaccia o a livello globale
	- Stateful Firewall:
	  - Tracciamento delle connessioni con filtraggio basato sulle sessioni
	  - Ispezione dei flussi TCP/UDP/ICMP con gestione dinamica delle porte
	  - Protezione contro i SYN flood e i pacchetti malformati
	- Supporto NAT / PAT:
	  - Source NAT, Destination NAT, Port Address Translation
	  - Utile per l'interworking da IPv4 a IPv6 e per l'isolamento del traffico
	- 802.1x
	  - Autenticazione della porta di accesso tramite EAP con backend RADIUS

SERVIZI	- Client DHCP, server DHCP con funzioni anti-spoofing, relay DHCP - Proxy DNS intelligente, locale e remoto - Traceroute - Supporto client e server NTP - DynDNS
GESTIONE e CONFIGURAZIONE	- SNMPv2, SNMPv3 - Netflow - Server Telnet con più sessioni simultanee - Server SSH con più sessioni simultanee (SSHv2) - Gestione dei guasti Syslog /Trap - Supporto Radius, TACACS+ - Modelli Netconf e YANG - Tracciamento per la gestione dei backup, comandi ed eventi programmati - Aggiornamento del software via TFTP, FTP, sFTP, HTTP, HTTPS, SCP - Configurazione tramite Command Line Interface (CLI), Text/Menu oriented e Telnet - Suite TNA (Tiesse Network Architecture) per l'autoprovisioning e la gestione remota automatizzata - Gestione di un numero illimitato di configurazioni

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SD-WAN with TNA Suite

IMOLA routers are integrated into the **TNA (Tiesse Network Architecture)** suite, the SD-WAN solution developed by Tiesse in order to make available a dynamic, secure, reliable,

high-performance and scalable solution. The TNA solution has at its base the usability of the product and emphasizes the effectiveness and easy realizability of an SD-WAN solution without having to implement complex and expensive architectures and for this adoptable by few and structured end customers.

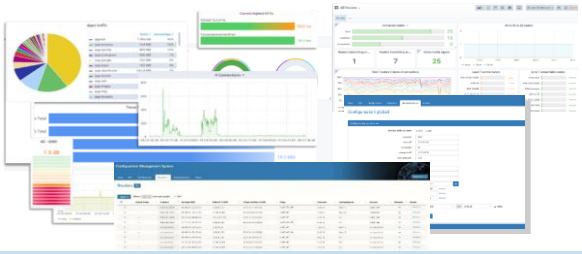
With highly established and robust use cases, the TNA suite has integrated, with a modular architecture, innovative features to realize a concrete SD-WAN solution that is responsive to market needs.

The TNA is a **modular All-In-One** solution composed of separate entities: **CoS**, **MoS**, and **NAD** that work together organically to handle all aspects of managing a network in both IP and Overlay architectures. In this case, the suite is complemented by an additional module called OVN.

At the heart of Tiesse's SD-WAN solution is **Intelligent Routing**, which enables the network, whether in overlay scenarios or not, to react to changes in state, being able to operate autonomously at its best even in the presence of congestion, saturation or abnormal traffic.

TNA Suite DASHBOARD

Through a flexible dashboard, which can also be customized, the SD-WAN can be administered and managed.



** Note: Available features may vary by product model.*

Dashboard	Description	Parameters
ROUTER	**Monitoring and visualization of key resources for each device (Router, CPE, IoT)**	– Reachability and connectivity to a target network/internet (primary/backup or other) – Uptime and number of reboots – Round Trip Time last mile or to target Internet – CPU utilization, memory, router load based on current and queued activities – Number of active connections – Throughtput inbound/outbound and traffic generated/received by individual interface – Traffic classification by type of application for specific device – Number of devices connected to active Wi-Fi networks – GPON optical connections: uptime, optical power input/output, SFP temperature – Cellular network connections: signal strength for each connection type (5G/4G/3G/2G and SINR, RSRP, RSSI, RSCP, EC/IO), SIM in use – xDSL connection: uptime, signal status and attenuation, noise margin (SNR), redundancy errors (CRC)
GENERAL	**Aggregate monitoring and visualizations**	– Total number of apparatus: – connected, reachable, and unreachable as a function of uptime – transmitting on a specific interface – with an active mobile connection – active grouped by connection type (primary, backup, other) – connected over 5G, 4G, 3G, and 2G networks – Reachable and unreachable devices, by uptime, over a specified time range – Device classification/sorting: – top 5 (active) by number of connections – time order of last connected routers and routers no longer reachable – by response time (highest and lowest RTT) to a given destination
OVN	**Monitoring and visualizations of data related to the Overlay Network**	– Total number of apparatus: – connected, reachable, and unreachable as a function of uptime – with an active mobile connection – broadcasting on a specific interface – active grouped by connection type (primary, backup, other) – Reachable and unreachable devices, by uptime, over a specified time range – Device classification/sorting: – top 5 (active) by number of connections – time order of last connected routers and routers no longer reachable – by response time (highest and lowest RTT) to a given destination

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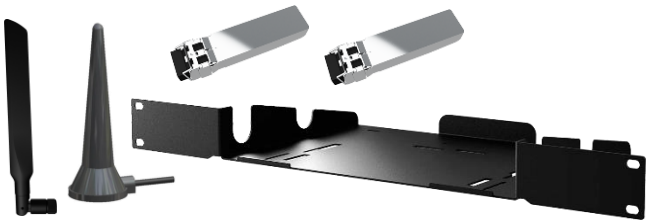
ADD-ONS

Optional accessories such as antennas for both indoor and outdoor omnidirectional and directional installations, SFP transceiver modules and rack-mount kits are available. Please consult the relevant datasheets, which can be downloaded from www.tiesse.com.



Images for illustrative purposes

OTHER INFORMATION AND SUPPORT

SUPPORTO.TIESSE.COM

- Technical documentation, installation instructions, quick start guide, first access data
- Firmware updates
- Declaration of conformity EMC, RED, RoHS, ...
- Technical support request
- End of sale and end of product support information
- Warranty repair and product reconditioning

WIKI.TIESSE.COM

- Website dedicated to software documentation
- User manuals
- First access guides
- Case studies, tutorials and other useful resources for product use

PRODUCT IMAGES

Front view, LED side

Back view, ports side

Front view, LED side, with external Wi-Fi antennae

Back view, door side, with external Wi-Fi antennae

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SUSTAINABILTY

SYSTEM

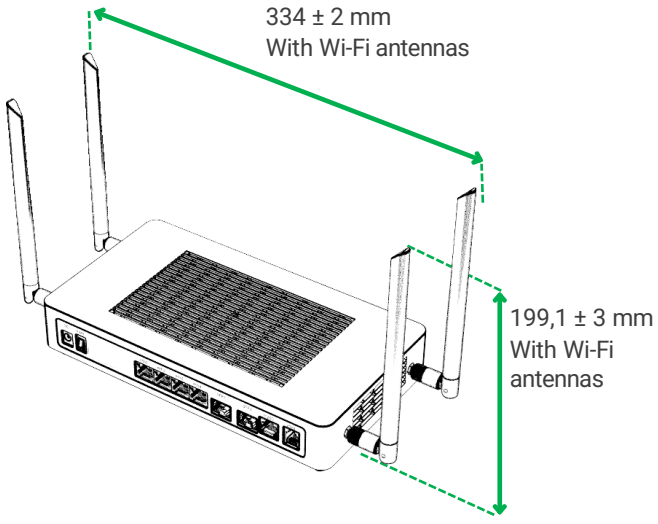
Power	- 12V external desktop power supply - On/Off button
Colling	Fanless
Consumption (full functions)	≈ 20W
EEE (Energy-Efficient Ethernet)	Tiesse products comply with the EEE (802.3az) standard, which saves energy by automatically reducing the consumption of Ethernet ports during periods of low traffic, without altering their performance.
Dynamic Power Scaling	Tiesse products use control mechanisms to automatically reduce power consumption by lowering the CPU clock frequency when the load is low.
Mean Time of Failute (MTBF)	≈ 156804 hours

ENVIRONMENTAL DATA

Operations	**Temperature**	–10° C / +45° C
	Humidity	5% ~ 95% (non condensing)
Storage	**Temperature**	–40° C / +85° C
	Humidity	5% ~ 95% (non condensing)

SIZE and WEIGHT

Machine body	280,8 x 145,2 x 50,4 (L x P x A mm)		
Total weight	≈ 2045 gr *(maximum weight including packaging and accessories)*		
	Product	**Accessories**	**Packaging**
	≈ 1100 gr	≈ 410 gr	≈ 535 gr



OTHER INFORMATION

Packaging and wrapping	100% of the packaging material of the individual product is paper/cardboard - 0% plastic.
	100% of the packaging material is recyclable
RAEE waste	For the correct disposal of Waste Electrical and Electronic Equipment (WEEE), pursuant to Article 26 of Legislative Decree No. 49 of 14 March 2014 'Implementation of Directive 2012/19/EU': contact raee@tiesse.com

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Tiesse
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Tiesse is a totally Italian company with more than 25 years of experience in the design, development and production of network equipment and IoT devices, suitable for use in mission-critical and industrial scenarios. Tiesse's most successful series, Imola, Lipari and Levanto, are innovative, competitive and certified, and are present in the networks of the major telecommunications operators, in the energy sector, large-scale distribution and vertical sectors, both in the Italian and foreign markets.

Further information on Tiesse solutions can be found on the company website www.tiesse.com.

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