A Survey of Transport Security Protocols

draft-taps-transport-security

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Updates

- Improve protocol justification text, and sort protocols based on use and impact
- Canonicalization of security feature set
- Interface cleanup

Security Feature Set

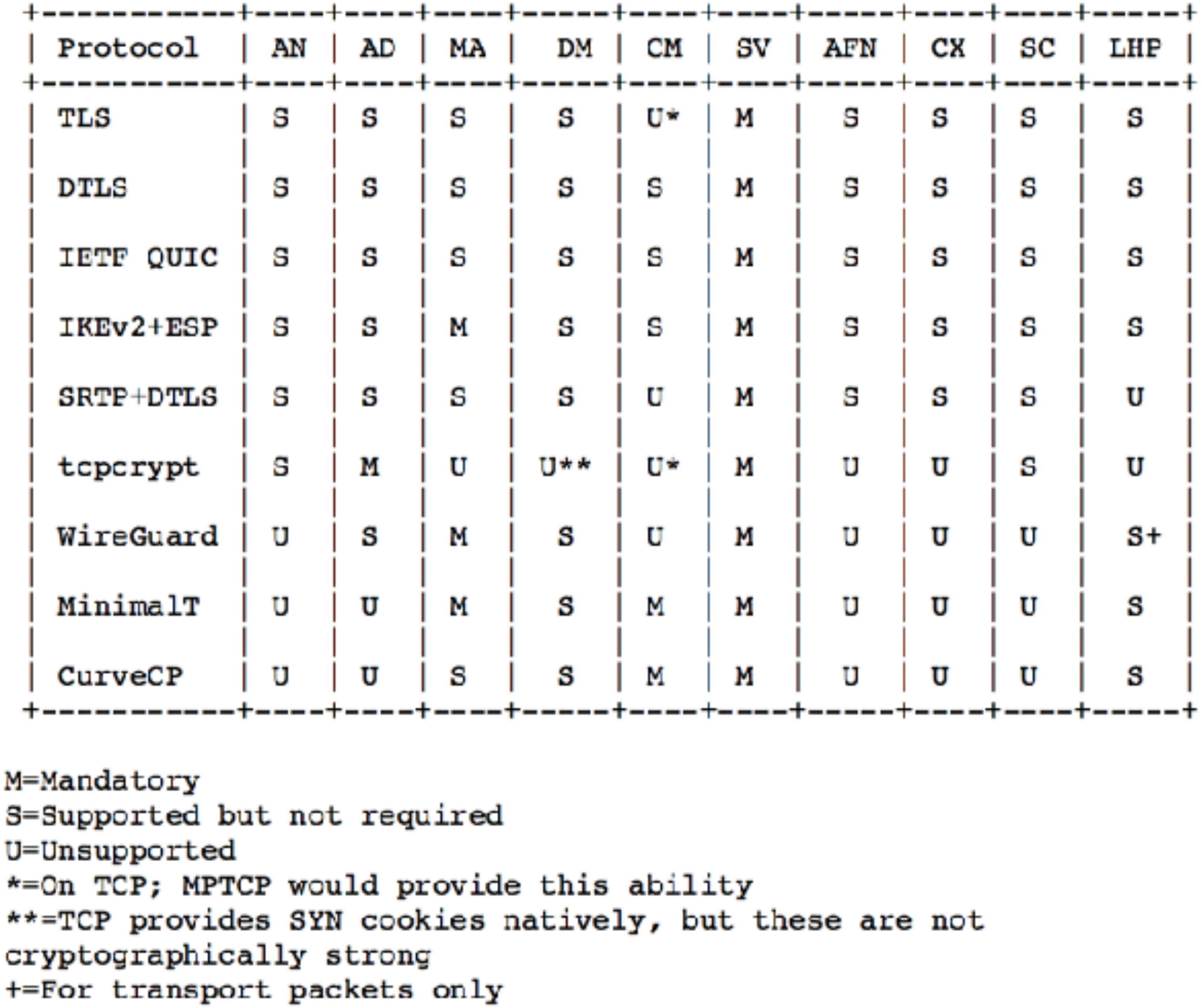
- Forward-secure key establishment
- Cryptographic algorithm negotiation
- Stateful and stateless cross-connection session resumption
- Peer authentication
- Mutual authentication
- Record confidentiality and integrity (partial confidentiality and integrity, too)
- …

Mandatory Features

- Segment or datagram encryption and authentication
- Forward-secure key establishment
- Public key (raw- or certificate-based) authentication
- Responder authentication
- Pre-shared key support

Optional Feature Applicability

Optional features are optional, and applicable to some protocols

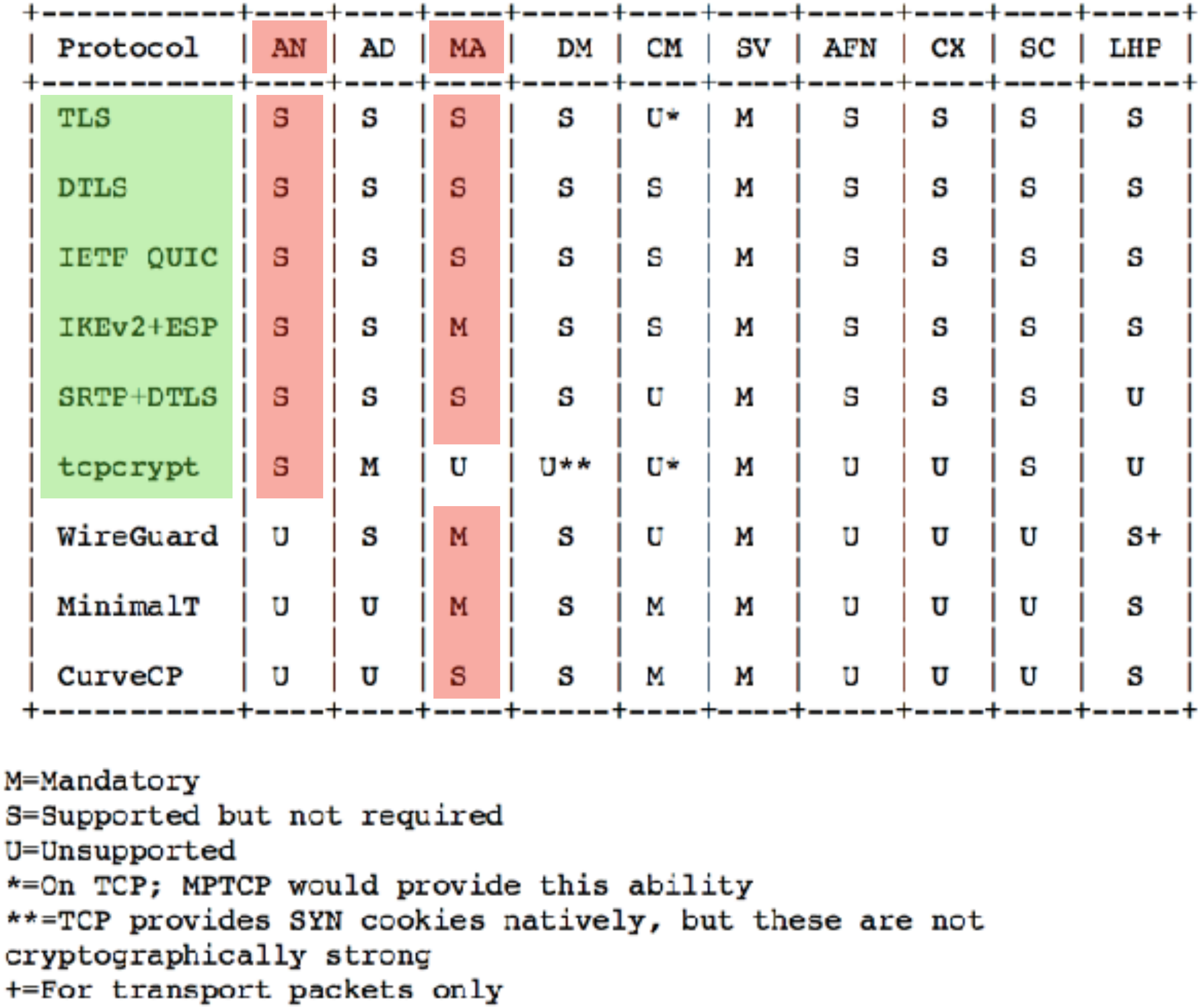


Protocol	AN	AD	MA	DM	CM	SV	AFN	CX	SC	LHP
TLS	S	S	S	S	U*	M	S	S	S	S
DTLS	S	S	S	S	S	M	S	S	S	S
IETF QUIC	S	S	S	S	S	M	S	S	S	S
IKEv2+ESP	S	S	M	S	S	M	S	S	S	S
SRTP+DTLS	S	S	S	S	U	M	S	S	S	U
tcpcrypt	S	M	U	U**	U*	M	U	U	S	U
WireGuard	U	S	M	S	U	M	U	U	U	S+
MinimalT	U	U	M	S	M	M	U	U	U	S
CurveCP	U	U	S	S	M	M	U	U	U	S

M=Mandatory
S=Supported but not required
U=Unsupported
*=On TCP; MPTCP would provide this ability
**=TCP provides SYN cookies natively, but these are not
cryptographically strong
+=For transport packets only

Example

Systems which want to provide algorithm negotiation (AN) and mutual authentication (MA) can support outlined protocols



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DTLS	S	S	S	S	S	M	S	S	S	S
IETF QUIC	S	S	S	S	S	M	S	S	S	S
IKEv2+ESP	S	S	M	S	S	M	S	S	S	S
SRTP+DTLS	S	S	S	S	U	M	S	S	S	U
tcpcrypt	S	M	U	U**	U*	M	U	U	S	U
WireGuard	U	S	M	S	U	M	U	U	U	S+
MinimalT	U	U	M	S	M	M	U	U	U	S
CurveCP	U	U	S	S	M	M	U	U	U	S

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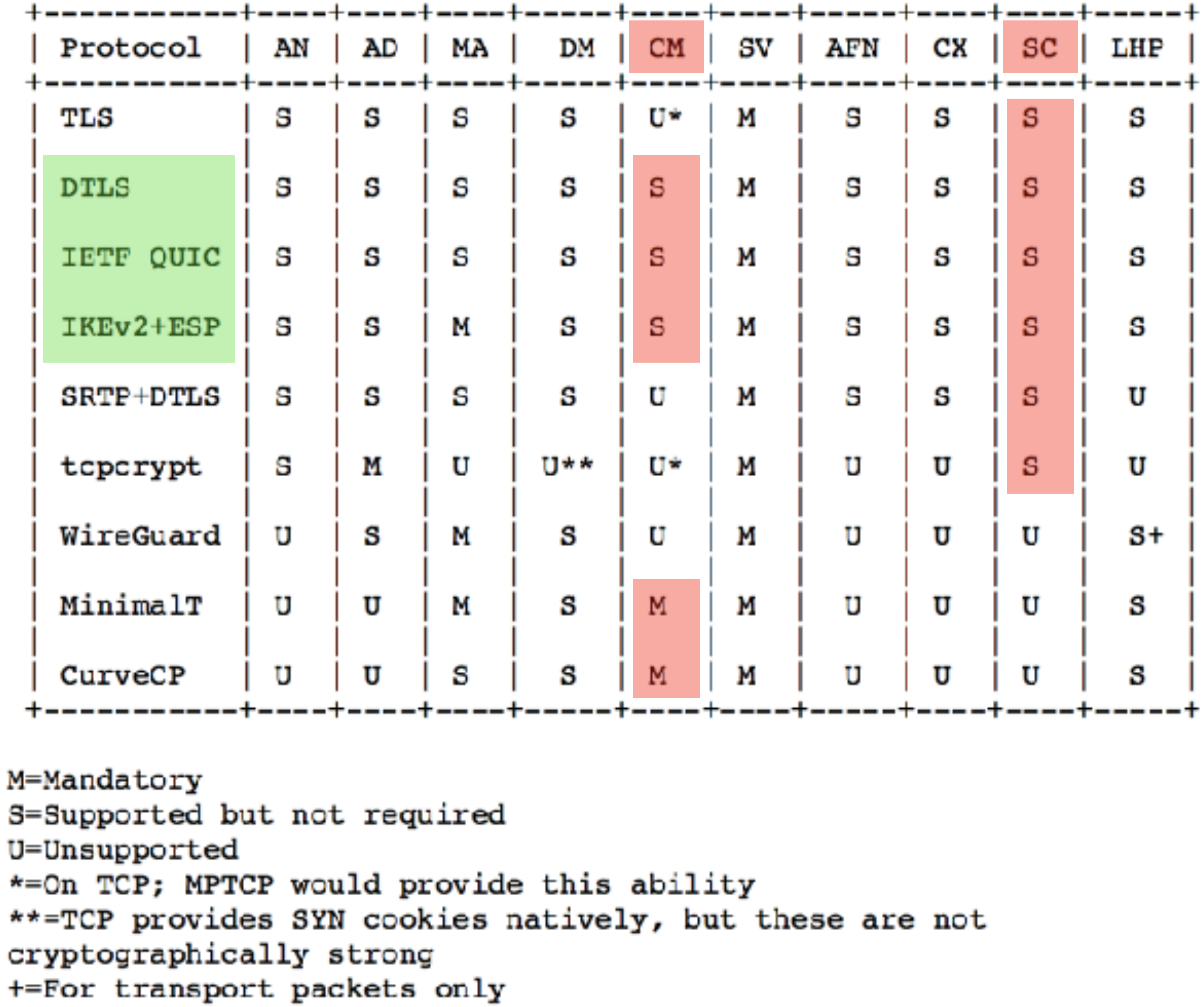
Example

Systems which MUST provide connection mobility (CM) and session caching and management (SC) should implemented outlined protocols



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DTLS	S	S	S	S	S	M	S	S	S	S
IETF QUIC	S	S	S	S	S	M	S	S	S	S
IKEv2+ESP	S	S	M	S	S	M	S	S	S	S
SRTP+DTLS	S	S	S	S	U	M	S	S	S	U
tcpcrypt	S	M	U	U**	U*	M	U	U	S	U
WireGuard	U	S	M	S	U	M	U	U	U	S+
MinimalT	U	U	M	S	M	M	U	U	U	S
CurveCP	U	U	S	S	M	M	U	U	U	S

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Informal Feedback

Remove protocol details that do not affect features or interfaces

- Example: IKEv2 details are irrelevant

Informal Feedback

Trying to generalize security interfaces for all protocols is **hard**

- Generic and protocol-specific interfaces must be provided.
- Generic ones permit protocols to be added, specific ones permit applications to tune particular protocol behavior (and possibly ossify)

Informal Feedback

Protocol equivalence MUST be based on name, not feature availability

- We cannot (yet) prove security protocol equivalence, so do not attempt to do so
- Implications on TAPS architecture and implementation drafts

Next Steps

- Formally circulate draft to security area for feedback
- Consider relocating “obscure” protocols, e.g., MinimalT and CurveCP